The Ursa Major Cluster of Galaxies. I. Cluster Definition and Photometric Data

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ABSTRACT

The Ursa Major Cluster has received remarkably little attention, although it is as near as the Virgo Cluster and contains a comparable number of HI-rich galaxies. In this paper, criteria for group membership are discussed and data are presented for 79 galaxies identified with the group. Of these, all 79 have been imaged at B, R, I bands with CCDs, 70 have been imaged at K' with a HgCdTe array detector, and 70 have been detected in the HI 21 cm line. A complete sample of 62 galaxies brighter than $M_B = -16.5$ is identified. Images and gradients in surface brightness and color are presented at a common linear scale. As has been seen previously, the galaxies with the reddest global colors are reddest at the centers and get bluer at large radii. However, curiously, among the galaxies with the bluest global colors there are systems with very blue cores that get redder at large radii.

Subject headings: galaxies: clusters (Ursa Major) - galaxies: photometry

1. What is the Ursa Major Cluster?

Within a radius of 3000 km s^{-1} of our Galaxy there are three moderate-sized clusters. By happenstance, they are all at roughly the same distance. Two are well-known: the Virgo and Fornax clusters. The third is remarkably poorly known: the Ursa Major Cluster. These three clusters are very different in their properties. The Virgo Cluster is the most massive, with a velocity dispersion of 715 km s^{-1} and a virial radius of 730 kpc (Tully 1987; see group 11-1), and contains a mix of early-type galaxies concentrated toward a core and late-type galaxies over a more dispersed region. The Fornax Cluster is the most compact, with a velocity dispersion of 434 km s^{-1} and a virial radius of only 270 kpc (see group 51-1), and a majority of members are early-type systems. The Ursa Major Cluster is the most poorly defined, with a velocity dispersion of only 148 km s^{-1} and a virial radius of 880 kpc (see group 12-1), and contains essentially only late-type galaxies distributed with no particular concentration toward any center. The total numbers of gas-rich systems in the Ursa Major and Virgo clusters are comparable. These group properties are summarized in Table 1. In terms of galaxy content, one would construct a Virgo Cluster with three parts Fornax and one part Ursa Major.

The Ursa Major Cluster has been difficult to define and has received relatively little attention for two main reasons. The first, already stated cause for ambiguity, is the lack of concentration toward any core. Second, the Ursa Major Cluster lies in a particularly confusing part of the sky because it is in the plane of the Local Supercluster at the junction of filamentary structures. In particular, it lies behind the long axis of the filament of galaxies we live in, the so-called the *Coma-Sculptor Cloud* (Tully & Fisher 1987; Tully 1988*a*). Figure 1 illustrates the location of the Ursa Major Cluster with respect to the Virgo Cluster and ourselves.

In spite of the potential for confusion, we claim there is probably little contamination in the Ursa Major sample that will be presented, basically because the velocity range of the cluster is so small. The definition of the cluster that will be pursued here is essentially the same as in our previous work (Tully 1987; Pierce & Tully 1988). However, it is radically different from the closest correspondence in the group catalogs by Huchra & Geller (1982; their group No. 60) and Geller & Huchra (1983; their group No. 94). Their algorithm caused them to blend much of the structure in the filaments Tully & Fisher called the Coma-Sculptor Cloud and Ursa Major Cloud into one unit. The Ursa Major Cloud contains the Ursa Major Cluster. The correspondence with the catalog by de Vaucouleurs (1975) is better but he split the cluster in two (his groups 32 and 34) and there are membership exchanges with his CVn II group (his No. 10 = group 14-4 in Tully 1987). Fouqué et al. (1992) similarly split the cluster in two. Their UMa I S group completely overlaps with

our version of the cluster but their UMa I N group is drawn from Tully's 12-1, 12-2, and 12-3 groups. Differences will be revisited once our definition has been described. The more recent catalog by Nolthenius (1993) contains the Ursa Major Cluster as group 73 and in this case the agreement is excellent. There is only slight exchange with Tully's group 12-6.

Although at least Nolthenius (1993) and Tully (1987) are consistent, the situation is still sufficiently confused that an effort at graphical clarification is warranted. There will be progression through three figures. Figure 2 provides an overview of the region and the problem. The expedient of the supergalactic coordinate system is used because in this reference frame the cluster is equatorial so rectangular plots are almost free of distortion. The cluster and associated filaments are conveniently strung out along the longitude axis in this display. The symbols locate all 275 galaxies in the *Nearby Galaxies Catalog* (Tully 1988*a*; *NBG* catalog) in the projected region with $V_\circ < 2000$ km s^{-1} ($V_\circ = V_{helio} + 300\sin\ell\cos b$). The filled circles identify members of cloud 12 = Ursa Major Cloud, which contains the Ursa Major Cluster. The open squares identify members of the foreground cloud 14 = Coma-Sculptor Cloud. The crosses at the edges of the figure identify the fringes of other filamentary clouds.

One may be discouraged by the confusion in Figure 2, particularly with the appreciation that galaxies do not come with cloud labels attached. Figure 3 provides the third dimension. Velocities are plotted against the supergalactic longitude projection in this cone diagram. The symbols make the same associations with clouds 12 and 14. The members of other clouds are ignored because, as seen in Fig. 2, they are sufficiently distinct in supergalactic latitude. In panel *a*, the data is presented with no more editorial comment than implicit in the cloud identifications. In panel *b*, the space has been broken up into the group identifications given by Tully (1987, 1988*a*).

Our focus is on the Ursa Major Cluster, group 12-1. It can be seen that the potential confusion in this case is with the entities called 12-2, 12-3, 12+6, and 14-4 (the negative group numbers refer to units with luminosity densities above a threshold such that they qualify as 'bound' while the positive numbers refer to 'associations' with gravitationally unbound members). With Figure 4, we zoom in on this region. The spatial scale is increased from Fig. 2 and the velocity window has been shaved to $400 < V_\circ < 1700$ km s^{-1}.

In this new figure, only the proposed members of group 12-1 (the Ursa Major Cluster) are represented by filled circles. The small 12-2 group is marked by boxes with inner crosses. The troublesome 12-3 group members are labeled with open circles and inner crosses. Other members of the 12 cloud are represented by crosses. The 14 cloud members are still open squares; they all belong to group 14-4 in this region.

The Ursa Major Cluster (12-1) is defined in this paper by a window in projection, the 7.5° circle centered at $11^h56.9^m + 49°22'$ ($SGL = 66.03$, $SGB = 3.04$) superimposed on Fig. 4, and a window in velocity, $700 < V_{helio} + 300\sin\ell\cos b < 1210$ km s^{-1}. The fussy upper velocity bound was chosen to differentiate from the 12-3 group at a slightly higher velocity and slightly displaced in projection. From Fig. 4 one sees that confusion in projection onto the 7.5° circle of group 12-1 = Ursa Major Cluster comes only from groups 12-2, 12-3, and 14-4. The first two of these are a problem and are discussed in the next paragraph. On the other hand, there is a clean velocity gap below 700 km s^{-1} that separates the 14-4 group.

Why do we differ from Fouqué et al. (1992)? If the tiny 12-2 group is ignored, then each of us agrees that the galaxies on the supergalactic plane spanning $73.5 < SGL < 56$ and $700 < V_0 < 1700$ km s^{-1} lie in two groups and the difference is in the split. There *must* be at least two groups in this window because there is a strong gradient to higher velocities in proceeding to lower supergalactic longitudes (see Fig. 3). We contend that the Fouqué et al. split is unsatisfactory because their UMa I N still contains the strong velocity gradient with longitude and the separation from UMa I S is arbitrary. With our split between 12-1 and 12-3 groups the Ursa Major Cluster has only a slight velocity gradient with longitude, at a level that could easily be real. Obviously, though, some individual objects in the vicinity of $SGL \sim 60$ may be misplaced between the two groups 12-1 and 12-3. Ten galaxies within our 12-1 group window with $SGL < 61$ are most subject to confusion.

Is it unreasonable to call this region a cluster? The referee says "I see no evidence for anything that even vaguely resembles a cluster. This region is a supercluster filament." Evidently, this region is not like our common perception of a cluster. Maybe Figure 5 helps. Each panel illustrates an equal window of $\Delta SGL = 14°$ and $\Delta SGB = 9°$, with the middle panel centered on the cluster and the top and bottom panels shifted up and down the supergalactic plane. The filled histogram is associated with the cluster.

For the moment, let us only worry about the galaxies we associate with the putative cluster which contribute to the filled histogram. In this projected area similar to the dimension of the Virgo Cluster there are a comparable number of HI-rich galaxies as in Virgo, and there are almost enough luminous galaxies to meet the Abell richness zero standard. Within the full 7.5° radius window of our cluster definition there are 30 galaxies within 2^m of the third brightest galaxy in B and 26 galaxies within 2^m of the third brightest galaxy in R. The Abell radius of $1.5h^{-1}$ Mpc (Abell 1958) translates to 6.5° with our distance corresponding to $h = \mathrm{H}_0/100 = 0.85$, whence only one bright galaxy is lost to the above counts. The Abell richness count is thus 29 in B or 25 in R, slightly short of the count of 30 required to qualify as richness zero. Besides Virgo, there is no other 2 Mpc-scale region with anything like this richness within 3000 km s^{-1}. It can be seen from the group

parameters in Tully (1987) that |potential energy | > |kinetic energy| for this region (ie, it is bound) if $M/L_B \gtrsim 40M_\odot/L_\odot$. In this reference it is shown that 70% of nearby galaxies are in groups and that essentially all groups with at least 5 members have virial M/L_B values in excess of $40M_\odot/L_\odot$. Hence, it is probable that the region under discussion is bound, which is a reasonable distinction of a 'cluster' from a 'filament'.

Admittedly, the region is not cleanly distinct from a filament. It is perhaps arbitrary to separate the 12+6 group/association from the cluster. The 12-3 and 14-4 groups are almost certainly separate but individual galaxies could easily be given erroneous group assignments. There is ambiguity about the stability of the cluster because of the strong sheer caused by the proximity of the Virgo Cluster. In actuality, perhaps only sub-units are bound and some parts have positive energy.

It should be clarified that the cluster definition used here serves some needs but not others. It gives a list of *high probability* associates with the cluster. The result is a sample of galaxies that *probably share similar distances*. The primary original motivation for this work was to identify a sample that would minimize relative distance effects in luminosity-linewidth distance estimator relationships (Tully & Fisher 1977). We want to have an unbiased sampling of a volume to a magnitude limit. It is not a tragedy for this purpose to loose some cluster members as long as the process of elimination is random with respect to the individual galaxy properties. With windows in projection and velocity, true members that are rejected because they lie outside the prescribed windows would not be expected to lie in any preferred part of the luminosity-linewidth diagrams. The only cost of rejection is reduced statistics. Of course, the erroneous inclusion of interlopers add scatter to the derived properties of the group. Fortunately, the cluster is actually cleanly defined except at the border with the 12-3 group.

It is to be appreciated that a window definition would be unacceptable if our purpose is to conduct a virial analysis, for example. The outlying members in velocity and space contribute significantly to the energy budget. There are two high velocity systems (NGC 4142 and UGC 6802) projected onto the 7.5° cluster that would deserve consideration as members and the disposition of the 12-2 triplet might be reconsidered.

In summary, although the Ursa Major Cluster is embedded in a messy region, the restrictive spatial and velocity window isolates a sample of high-probability cluster members. This procedure works in large part because the universe is built such that there are not many 'free-floating' galaxies and the velocity dispersions in groups are low (Tully 1987).

2. Members of the Cluster

To date, we reckognize 79 cluster members. Their distribution on the sky is seen in Figure 6 free of the distraction of non-cluster projections. All these galaxies have known redshifts since an appropriate velocity is a membership prerequisite (in the absence of velocities, the potential contamination from the Local Supercluster would be intolerable). There is sample completion within limits to be discussed but the 79 member-designates includes all known systems that pass through the selection window.

The principal objective when the project began was to have a complete magnitude limited sample of late-type galaxies to aid in the calibration of luminosity-linewidth relationships. There is completion for galaxies of type Sab and later to a limiting magnitude of $m_{zw} = 15.2^m$. Among earlier types, there is completion to the CfA1 survey limit of $m_{zw} = 14.5^m$ (Huchra et al. 1982). Fainter galaxies than these limits have turned up in neutral hydrogen observations of the region of the cluster. In particular, our collaborative study of the Ursa Major Cluster has recently involved observations of selected fields with the Westerbork Synthesis Radio Telescope and a few dwarf, gas-rich objects have been uncovered.

The 79 galaxies currently accepted into the cluster are identified in Table 2. Col. (1) provides the *Principal Galaxies Catalogue* identification (de Vaucouleurs et al. 1991). Col. (2) gives the common name. Cols. (3-8) contains equatorial, galactic, and supergalactic coordinates. The equatorial coordinates have been determined by registration of stars on the CCD images with the Space Telescope guide star catalog and should be accurate to $1''$. Col. (9) gives a numeric morphological type (de Vaucouleurs et al. 1991) evaluated from the CCD images presented in this article. Col. (10) gives the Burstein & Heiles (1984) galactic reddening value at B band. Cols. (11-13) give systemic velocities (heliocentric and adjusted for motion of $300\sin\ell\cos b$ km s^{-1}) and uncertainties. Cols. (14-15) give linewidths at 20% of full intensities and uncertainties. Col. (16) gives HI integrated fluxes in units of Jy km s^{-1}. The velocities and HI information are accummulated from the literature.

There are flags "f" and "q" by the names of some entries in Table 2. There are 17 cases with "f" that are fainter than $M_B = -16.5$, hence not part of the luminosity-limited complete sample. There are 10 cases with "q" at $SGL < 61$ that are questioned members because of possible confusion with groups 12-2 and 12-3.

3. Imaging Photometry

Optical images have been acquired in the B, R_C, I_C (C=Cousins) passbands for all 79 galaxies with a variety of CCD and telescope combinations. Early observations were with a TI 500 device behind a focal reducer on an 0.61m telescope at Mauna Kea Observatory in order to acquire a large field. Later, the detector was upgraded to a TI 800 device and, for the most part thereafter, the focal reducer and detector were used on the University of Hawaii 2.24m telescope. After 1992, the focal reducer was eliminated and observations were made at the 2.24m telescope with Tektronics CCDs, first with 1024 pixels on a side and later with 2048 pixels on a side. With these various combinations, it was possible to obtain data with a satisfactory amount of sky background in each image.

Infrared images at K' have been obtained for 70 of these galaxies with a 256x256 HgCdTe detector using two telescope set-ups. The large galaxies have been observed with the 0.61m telescope which gave an $8'$ field, while the small galaxies have been observed with the 2.24m telescope and a $3'$ field. As with the optical observations, the fields are chosen large enough to provide sky background in each image.

A log of the observational set-ups for each galaxy and all passbands is provided in Table 3. The observation and reduction procedures are familiar with the CCD material and only brief comments are in order. Standard exposures were 3 minutes at R, I and 6 minutes at B, K' on the 2.24m telescope and 5 minutes at R, I and 10 minutes at B, K' on the 0.61m telescope. The high surface brightness galaxies could saturate in the central pixels with our standard exposures designed to reach faint levels of emission and in such cases short exposures were also taken. The information from the short and long exposures are combined.

The K' observations are somewhat more complicated because of the high and variable sky background. The images are composites of six dithered exposures in each case. An exposure sequence on a target galaxy would always be either preceded or followed by a sequence of exposures on blank sky with identical exposures and nearly identical inter-readout histories. The sky stability conditions were superior for the observing run on the 2.24m telescope. However, the galaxies observed with the 0.61m telescope were the high surface brightness objects, hence were more prominent above the sky. A side benefit of the dithering procedure is the elimination of dead spots from bad pixels.

All the images were reduced with two separate reduction packages. The CCD data was initially analyzed with the GASP software described by Pierce (1988) and the K' data was initially analyzed by software developed by JSH and RJW. Subsequently, the more recently obtained raw images and all previously reduced flatfielded images were reanalyzed within

the Groningen Image Processing SYstem (GIPSY, http://www.astro.rug.nl/∼gipsy/) environment by MV. This reanalysis permitted all frames in all bands of each galaxy to be treated the same. All available frames of a particular galaxy were aligned and image defects, foreground stars, and companion galaxies were masked out by hand. Cosmic ray events were removed by a median filtering in a 3×3 pixels box dragged over the entire image. A more detailed description of the reduction procedures will be given by Verheijen (Ph.D. thesis in preparation).

Figure 7 (Plates 1-9) are B CCD images of the 79 galaxies in the Ursa Major Cluster observed in our program, ordered from brightest to faintest in integrated blue light. The first 8 plates contain the complete sample and the fainter galaxies are shown in the ninth. The linear scales are the same for each system. At our estimated distance for the cluster of 15.5 Mpc, $1'' = 75$ pc.

4. Surface Brightnesses and Scale Lengths

Our photometric analysis begins with attempts to define the ellipticities and position angles of isophots. The bottom panels of Figure 8 provide plots of axial ratio values as a function of radius from R-band images. In roughly a quarter of the cases the axial ratios are well constrained and hardly change with radius, in roughly half the cases the axial ratios are adequately constrained, and in the remaining quarter of the cases the isophotal axial ratios are quite unstable. In those difficult cases, the axial ratio instabilities are attributable (with roughly equal occurances) to (i) interactions with companions, (ii) bars, (iii) edge-on lenticulars where disks give way to bulges, and (iv) intrinsic irregularities among late, low surface brightness systems. The horizontal lines in the panels labeled b/a of Fig. 8 indicate the ellipticities that we ultimately associate with the inclinations of the galaxies. In some cases, information leading at least partially to these inclinations is provided by velocity fields (NGC's 3718, 4051, 4389, UGC's 6917, 6930) or morphological considerations (UGC's 6816, 6922, 6956). Radially averaged position angles and ellipticities $(1 - b/a)$ are recorded in the summary of the photometric results, Table 4. Once position angles and ellipticities are fixed, surface brightnesses are computed in annuli at one arcsecond intervals. Position angles, ellipticities, and incrementation intervals are kept the same for all four passbands. The run of surface brightness with radius is shown in the top panels of Figure 8 and the color differential $B - R$ is given in the middle panels.

From inspection of the luminosity profiles in Fig. 8, it is seen that there is good agreement between the various passbands except that the K' material is truncated $\sim 2^m$

shallower than the B, R, I material. The sky background is much worse at K'. It would require long exposures ($\sim 10^2$ min) to reach surface brightnesses at K' comparable to those at optical bands. Such long exposures are intolerable for survey programs involving hundreds or thousands of targets.

Inspection of the luminosity profiles also confirm that most of the galaxies are reasonably well described by single exponential growth curves. This circumstance is not surprising since essentially all the objects clearly have disk components. Consequently, exponential fits have been made to all the galaxies in the sample. The fits are characterized by two free parameters: a central surface brightness and a scale length.

The fits are sometimes far from perfect. It is common for profiles to deviate near the center. The deviations can be in either direction but it is more usual for there to be excess light compared with the expectations of the exponential disk. These situations are well known (cf, de Vaucouleurs 1959; Kent 1985). In cases where the profiles deviate at small radii, the central surface brightness associated with the exponential disk is an inward extrapolation of the fit across the main body of the galaxy. Growth curves can also deviate from the exponential relation at large radii. There can be evidence of truncation (van der Kruit & Searle 1981; eg, NGC 3953, UGCs 6399, 6917, 6969). Occasionally, there is an indication of upward curvature as if an $r^{1/4}$ bulge component is taking over, or perhaps the disk approximation is inappropriate (eg, NGC 4220). Often there is enough uncertainty in the sky subtraction that the possibility of a deviation from an exponential fall-off at large radius is difficult to evaluate.

For some purposes, it is desired to have exponential disk two-parameter fits for a complete sample but sufficient if these characterizations are crude. That is, even if on occasion a description in terms of an exponential disk does not fully make sense, the fit is a rough description that will be useful for statistical comparisons. It is with this motivation that the fits were made to all galaxies of all types in the sample.

At this stage, complicated bulge-disk separations are being avoided. Instead, we record several direct observables that are sensitive to the relative importance of bulges. There is computation of effective radii containing 20%, 50%, and 80% of the total light. A 'concentration index' can be formed out of the ratio of the 80% radius and the 20% radius. A galaxy with a prominent bulge contains 20% of its light within a relatively small radius and consequently has a large concentration index. We also record the *measured* central surface brightness (as opposed to the extrapolated disk central surface brightness) within a radius of $4''$ of the center. Presuming the galaxies are at the same distance, these surface brightnesses are relative *metric* quantities; ie, they are measures of light from equal volumes of space. For the Ursa Major sample, $4''$ radius corresponds to 300 pc.

Although in this paper our intention is to present raw data and to hold off on interpretation, there are some curious correlations in the basic data that deserve to be shown. Consider Figure 9. The left panels compare integrated colors with the disk central surface brightness colors while the right panels compare ratios of scale lengths with the disk central surface brightness colors. The top panels compare B and R, the middle panels compare B and I, and the bottom panels compare B and K'.

From the left panels, one sees that the *range* of colors is greater in the disk central surface brightnesses than in the integrated colors. The correlations in the data are steeper than the 45° line that maps equality between the two measures of colors. From the right panels, one sees that, in the progression from redder to bluer galaxies, *the redder scale lengths increase in comparison with the blue scale lengths.* It is not surprising that scale lengths are shorter toward the red for big galaxies as this observation is consistent with the proposition that galaxies get bluer at larger radii (cf, de Jong 1996). However, it appears that the situation is inverted among bluer galaxies. The bluest galaxies are particularly bluest at their centers and get *redder* at larger radii.

These bluest galaxies tend to be the faintest galaxies. There is a rough correlation, albeit with considerable scatter, between the tendancy to redden with radius and total magnitude. Roughly, the cross-over from galaxies reddening with radius (shorter exponential scale lengths at longer wavelengths) to the inverse occurs at $M_B \sim -17$. Perhaps the phenomenon can be understood at the faintest end because the centers of such galaxies are ambiguous and may tend to be defined by the brightening caused by recent star formation. Older stars would be more diffused. However, it is remarkable that the progression in properties in Fig. 9 is so tight.

5. Isophotal vs. Total Magnitudes

Fortunately, wide-field CCD photometry catches all but a few percent of the total light of high surface brightness galaxies. The common practise is to extrapolate to total magnitudes with the assumption that the light at large radii falls off in the manner of an exponential disk with central surface brightnesses and scale lengths that can be characterized by fits to the main body of the galaxies (Willick 1991; Courteau 1992; Mathewson, Ford, & Buchhorn 1992; Giovanelli et al. 1994). Sometimes the extrapolation is to a specific isophotal level (Schommer et al. 1993) or sometimes both isophotal and total magnitudes are provided (Han 1992; Lu et al. 1993).

The extension of the Ursa Major sample across a wide dynamic range to very low surface brightness galaxies provides an opportunity to study this problem in some detail. *While extrapolations to total magnitudes are small for bright galaxies, the extrapolations become increasingly important for fainter galaxies.* If light profiles are approximated by exponential decay with radius, it is theoretically anticipated and observationally confirmed that the fraction of the light contained within a specified isophotal level is a simple function of the disk central surface brightness. The total luminosity in some passband λ is:

$$L_T^\lambda = L_{lim}^\lambda + 2\pi(b/a)\Sigma_0 \int_{x_{lim}}^{\infty} x e^{-x/h} dx \tag{1}$$

where the observed luminosity within a limiting isophot is L_{lim}, the axial ratio of the isophots is b/a, the exponential disk central surface brightness is Σ_0 in solar units per arcsec^2, the disk scale length is h, and the radius from the center is x. Performing the integration:

$$L_T^\lambda = L_{lim}^\lambda - 2\pi(b/a)\Sigma_0 h^2[(1+(x/h))e^{-x/h}]_{x_{lim}}^{\infty} \tag{2}$$

These relations can be transformed to logarithmic units, where $\mu_0 = -2.5\log\Sigma_0$, so that the total magnitude is

$$m_T^\lambda = \mu_0^\lambda - 2.5\log 2\pi(b/a) - 5\log h \tag{3}$$

and the magnitude within an isophot corresponding to the radius x is

$$m_x^\lambda = m_T^\lambda - 2.5\log[1-(1+(x/h))e^{-x/h}] \tag{4}$$

At n scale lengths, $x/h = n$, the surface brightness drops by

$$-2.5\log e^{-n} = 1.086n. \tag{5}$$

Hence, we can specify the number of scale lengths we observe between μ_0 and $\mu_{x_{lim}}$

$$\Delta n = (\mu_{x_{lim}} - \mu_0)/1.086 \tag{6}$$

Hence, the extrapolation beyond the observed m_x^λ is

$$\Delta m_{ext} = 2.5\log[1-(1+\Delta n)e^{-\Delta n}]. \tag{7}$$

The fraction of the total light above, or below, a given isophot just depends on the number of scale lengths, Δn, down the exponential growth curve to the specified isophot. Hence, there is no dependency on the scale length h or the axial ratio b/a. The formulation provided by equations (6) and (7) is a simplification of those presented by the references in the first paragraph of this section. As usual, we require that the axial ratio is constant and the growth curve is well described by an exponential form.

The Ursa Major sample provides a wide enough range of central surface brightnesses to test the extrapolation model. While it is impossible to know what is going on at the isophotal levels lost below the sky, it is possible to test that the luminosity growth curves are behaving as expected as the faintest observable levels are approached. In Figure 10, there is a comparison between observations and model with the increment to total magnitudes over a two magnitude surface brightness interval just above the limiting observed isophots. The following isophotal levels are taken as the limits of our observations because these levels are just slightly above the levels we can consistently reach: $\mu^B_{lim} = 27$, $\mu^R_{lim} = 26$, $\mu^I_{lim} = 25.5$, and $\mu^{K'}_{lim} = 23.5$. Hence, the points plotted in Fig. 10 indicate the changes in magnitudes in the 2 mag isophotal range above these limits. Members of the complete sample ($M_B < -16.5$) are seen as filled circles. The expectations of the exponential disk growth curve model are given by the solid curves. The four panels give the equivalent information in the four passbands. There is the least scatter at R because the sky background conditions are most favorable. The scatter is only marginally worse at B (CCD quantum efficiency is lower) and at I (sky background is increased), but considerably worse at K' (sky background is much higher compared with the galaxy signal).

In fact, the model corrections are a small, but statistically significant, amount *larger* than the observed magnitude increments between the last two-magnitude isophotal surface brightness contours. The differences between passbands are not statistically significant. Similar results are found if, say, the last one-magnitude interval is considered instead. Averaging over the different passbands and different magnitude increments near but above the faint limits, it is concluded that the model *overestimates* the magnitude increments by 12%, with 3σ significance compared with no adjustment. There are two plausible reasons why the exponential model might give an overestimate: (i) there could be an additional bulge component so additions to the disk contribute fractionally less to the total light, and (ii) the disk may truncate at large radii (van der Kruit & Searle 1981). Since these possibilities are very real, we take an empirical approach and accept that statistically corrections should only be 88% of the exponential disk model corrections. It might be possible to do better by considering the particulars of individual galaxies but the corrections are usually small and uncertainties to corrections usually negligible. There are inserts in the panels of Fig. 10 that illustrate the adjustments that are adopted as a function of disk central surface brightness. Within the range of the complete sample, adjustment to total magnitudes are < 0.12 even at K' and uncertainties are < 0.04. However, the figures warn us that the situation rapidly becomes less favorable as one enters the dwarf regime. With dwarfs much of the light might lurk below the sky cut-off, especially at K'.

6. Tables of Photometric Results

The directly measured optical and near-infrared photometry results are accummulated in Table 4. The second column contains general information. Row 1: a numeric formulation of the morphological type (carried over from Table 2); row 2: the galaxy position angle (measured east from north); row 3 the ellipticity $\epsilon = 1 - (b/a)$ where b/a is the observed ratio of minor axis to major axis; row 4: the radius in arcsec at the isophotal level of 25 mag arcsec^{-2} in B band.

With the following columns, each row carries information for one of the photometric bands: B, R, I, and K' respectively. Col. 4: the dates indicate when the *best* data was obtained for a given object and filter. Col. 5: isophotal magnitudes; the isophotal levels are 27.0 in B, 26.0 in R, 25.5 in I, and 23.5 in K'. Col. 6: total magnitudes; the isophotal magnitudes given in the previous column are extrapolated to infinity as described in Section 5. Col. 7: the mean surface brightness of the center of the galaxy within an ellipse of axial ratio b/a and major axis radius of $4'' = 300$ pc. Col. 8: the extrapolated exponential disk central surface brightness. Col. 9: the disk exponential scale length. Cols. 10-12: the radii containing 20%, 50%, and 80% of the light, respectively.

Parameters that can be derived from the directly measured results are gathered for convenience into Table 5. The magnitudes in this table are adjusted for the effects of inclination by procedures that will not be described in detail in this paper. The recipes for these corrections are based on the model described by Tully & Fouqué (1985) except that a revised analysis has been independently carried out in each of the passbands. The amplitude of the correction can be found in an individual case by comparison of the adjusted magnitude in Table 5 with the raw total magnitude in Table 4. For reference, the maximum adjustment from face-on to edge-on is 0.84 mag at B, 0.58 mag at R, 0.46 mag at I, and 0.06 mag at K'. The absolute magnitudes are based on a distance modulus of 30.95 (distance of 15.5 Mpc) to the cluster.

The entries in Table 5 are the following. Col. 1: names are repeated. Col. 2: *top*, morphological type is repeated.; *bottom*, inclinations, i, are calculated from ellipticities in a standard fashion: $\cos i = \sqrt{((b/a)^2 - q_0^2)/(1 - q_0^2)}$ where the observed minor-to-major axial ratio is b/a and the intrinsic flattening is assumed to be $q_0 = 0.2$. Cols. 3-5: *top*, B, R, I, K' magnitudes adjusted for internal and galactic obscuration.; *bottom*, absolute magnitudes, assuming a distance modulus of 30.95. Cols. 7-9: *top*, the global colors $B - R$, $B - I$, and $B - K'$, respectively; *bottom*, colors associated with the exponential disk central surface brightnesses; $\mu_0^B - \mu_0^R$, $\mu_0^B - \mu_0^I$, and $\mu_0^B - \mu_0^{K'}$, respectively. Cols. 10-13: *top, cols. 10-12*, ratios of exponential scale lengths between the various bands; h_R/h_B, h_I/h_B, and $h_{K'}/h_B$,

respectively; *top, col.13*, a light concentration index, C_{82}, formed from the ratio of the effective radii containing 80% and 20% of the light. There are only small differences in this quantity between different filter bands. The values formed with the K' data are less stable because of higher sky noise. For these reasons, the concentration index provided here is a straight average of the B, R, I information and does not use the K' information; *bottom*, a measure of the *excess* light above the exponential disk component at the center of the galaxy. The difference is taken between the exponential disk central surface brightness and the mean surface brightness within the central $4'' = 300$ pc radius; $\mu_0^B - \mu_4^B$, $\mu_0^R - \mu_4^R$, $\mu_0^I - \mu_4^I$, and $\mu_0^{K'} - \mu_4^{K'}$, respectively. Col. 14: logarithms of the total luminosities in the B and K' bands in solar units assuming the absolute magnitude of the sun is 5.48 at B and 3.36 at K'.

7. Summary

Although the Ursa Major Cluster lacks concentration and lies in a confusing part of space, it is reasonably cleanly defined because it has such a small dispersion in velocity. We define the cluster by windows on the plane of the sky and in velocity in order to define a list of high-probability members. The 79 galaxies that are accepted lie within 7.5° of $\alpha = 11^h56.9^m$, $\delta = +49°22'$ and have measured velocities, $V_{helio} + 300\sin\ell\cos b$, between 700 and 1210 km s^{-1}. Most of the galaxies identified with the Ursa Major Cluster are spirals with normal gas content. The cluster almost qualifies as an Abell richness class 0 entity but it has not received much attention because it is so ill-defined. Probably the cluster is at an early evolutionary state.

We have managed to image all the cluster candidates with wide-field CCD set-ups and almost all the objects with a HgCdTe detector. A complete sample of 62 galaxies brighter than $M_B = -16.5$ has been defined. Images are provided for all the galaxies on a common metric scale and photometric parameters have been tabulated, including a measure of the central light concentration, exponential disk surface brightness zero-points and scale lengths, and effective radii containing 20%, 50%, and 80% of the light.

The data presented here has not been corrected for absorption effects or other inclination considerations. In parallel with these optical observations we are involved in a program of 21 cm HI observations with the Westerbork Synthesis Radio Telescope (Verheijen, Ph.D. thesis in preparation). The neutral hydrogen observations, adjustments to the raw optical information, and analyses of the physical properties of the sample will be addressed in subsequent papers. The one physical property of the sample that

we have presented at this time is the curiosity that, while redder galaxies (typically the more luminous ones) have very red centers and tend to get bluer at large radii, the bluer (typically smaller) galaxies tend to do the inverse. Galaxies with bluer centers and which usually are globally bluer tend to get redder at large radii.

8. Acknowledgements

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A. Appendix: Comments on Individual Objects

UGC 6399: Slightly lopsided toward the SE.

UGC 6446: Patchy low surface brightness disk makes it difficult to determine b/a. There is a bright star at the southern edge which somewhat contaminates the background.

NGC 3718: This galaxy is the largest in the cluster and has by far the largest disk scale length. The galaxy is so peculiar that it is difficult to categorize morphologically. It is probably strongly warped although the outer disk is kinematically well behaved. An obvious dust lane crosses in front of the nucleus which reddens the central regions considerably. There are several bright stars scattered across the disk.

NGC 3726: Lopsided toward the north with a rather bright star near the northern edge.

NGC 3729: Possibly a companion of NGC 3718 and responsible for the peculiar appearance of that galaxy. It has a high surface brightness ring surrounding a bar and a blob at the NE edge. There is a bright star in front of the SW part of the disk.

NGC 3769: Interacting with 1135+48. A high surface brightness ring surrounds a central bar. Extended and distorted HI tidal tails are detected in this galaxy.

1135+48 : Interacting companion of NGC 3769. It is an irregular dwarf probably in the process of being tidally disrupted by NGC 3769. Kinematically, it merges smoothly into the HI velocity field of NGC 3769.

NGC 3782: A bar dominated dwarf. The position angle and ellipticity were estimated from the envelope of the surrounding low surface brightness disk.

1136+46 : HI discovered companion of NGC 3782. Among the optically faintest identified cluster members.

1137+46 : Same comments as for 1136+46.

UGC 6628: Small point-like nucleus. Bright star in SE part. Too little sky in the K'-band image to allow a determination of the magnitude in that band.

UGC 6667: Highly flattened edge-on system suggests an intrinsic thickness of less than 0.2.

UGC 6713: Faint.

NGC 3870: High surface brightness bar embedded in a featureless disk or envelope. There is a small knot in the NW part of the disk.

NGC 3877: Very regular spiral with a small point-like nucleus. There is a very bright star just outside the field of view which corrupts the background somewhat.

UGC 6773: Faint diffuse system without a central concentration. There is a very bright star just off the frame which heavily corrupts the background. As a result, the magnitudes are badly determined.

NGC 3893: Heavily distorted outer regions

due to its companion NGC 3896. Two pronounced spiral arms. A patchy tail of debris runs off to the SE and reaches as far as 1 arcmin south of NGC 3896. The adopted ellipticity corresponds to that of the main unperturbed disk. The HI kinematics shows a strong warp.

NGC 3896: Companion to NGC 3983.

NGC 3906: Smooth face-on disk with a bar offset from the center. The adopted ellipticity was defined by the outermost isophotes.

UGC 6805: Among the smallest systems in the cluster. It shows a double nucleus at a small angular separation. High surface brightness with very short scale length.

NGC 3913: Lopsided disk with a sharp southern edge and a diffuse northern boundary.

NGC 3917: Very regular spiral with a small nucleus.

UGC 6816: Patchy and irregular.

UGC 6818: Probably interacting with a small dwarf at its NW edge. There seems to be a faint $m = 1$ mode spiral arm in the western part of this galaxy.

1148+48 : This galaxy is the smallest identified cluster member. It was discovered as a Markarian galaxy (MK1460).

NGC 3931: Possible elliptical galaxy.

NGC 3928: Faint spiral structure near nucleus.

UGC 6840: Bar dominated nearly face-on patchy low surface brightness system. Previously classified as an edge-on when only bar was seen. The kinematic position angle is roughly 45 degrees.

NGC 3924: Faint.

NGC 3938: Slightly lopsided toward the north. Small point-like nucleus.

NGC 3949: Note the diffuse extended halo which surrounds this system.

NGC 3953: One of the largest well-formed spirals in the cluster with a small bar and a point-like nucleus.

UGC 6894: Edge-on, late.

NGC 3972: Same comment as for NGC 3877 and NGC 3917.

NGC 3982: High surface brightness central region. Note the filament along the SW edge.

UGC 6917: Regular low surface brightness galaxy with a small central bar. There is a bright star just west of the center.

NGC 3985: There is bright compact region, offset from the center, from which an $m = 1$ mode spiral arm emerges which can be traced over 270 degrees.

UGC 6922: There seems to be a diffuse extension toward the SW.

UGC 6923: Companion to NGC 3992. Optical warp probably due to the tidal influence of NGC 3992.

UGC 6930: Note the small central bar and

the bright star at the NW edge.

NGC 3992: This is the brightest and fastest rotating galaxy in the cluster. It dominates three companions: UGC 6923, UGC 6940 and UGC 6969. It shows a nice grand-design spiral structure and a prominent central bar.

NGC 3990: Companion to N3998. A regular S0 with a clearly visible disk component.

UGC 6940: Companion to N3992. Among the faintest dwarfs identified in the cluster.

NGC 3998: Companion to N3990. It is classified as a LINER and there is an HI polar ring with a position angle perpendicular to the optical position angle. There is an extensive system of globular clusters associated with this galaxy. Although classified as S0 in the RC3 and Carnegie Atlas of Galaxies, NGC 3998 might very well be an elliptical.

UGC 6956: A bar dominated dwarf with a diffuse very low surface brightness disk.

NGC 4013: This almost perfectly edge-on system shows a prominent dust lane. There is a bright foreground star close to the center. There is a boxy bulge which extends far along the minor axis and is responsible for the outer part of the luminosity profile. It is extensively studied in HI and the outer gas disk is strongly warped.

UGC 6962: Interacting with UGC 6973. It shows a small diffuse central bar and the outer regions are kinematically distorted with warp characteristics.

NGC 4010: Note the dust patches in this edge-on system. The NE half seems to be more puffed up than the SW half.

UGC 6969: Dwarf companion to NGC 3992.

UGC 6973: Companion of UGC 6962. It has a very high surface brightness central region and an obvious dust lane in the SE part.

1156+46 : This very elusive system is the faintest galaxy in our sample with the lowest central surface brightness. It was detected at the edge of the CCD. It seems to be resolved into individual stars. The gradient of surface brightness with radius is so shallow that the exponential scale length could not be defined.

UGC 6983: Classified as a low surface brightness galaxy. Note the small but obvious central bar.

NGC 4026: There is an HI filament without an optical counterpart just south of this edge-on S0 galaxy.

UGC 6992: Faint.

NGC 4051: This Seyfert galaxy is clearly lopsided toward the NE. The HI velocity field shows global non-circular motions.

NGC 4085: Probably a companion to or in recent interaction with NGC 4088.

NGC 4088: A high surface brightness galaxy, among the most luminous in the cluster. It shows two distorted spiral arms causing irregular outer isophotes.

UGC 7089: Somewhat lopsided. Probably comparable to NGC 4010 when seen edge-on.

1203+43 : One of the faintest dwarfs in the cluster. Probably a companion to UGC 7094.

NGC 4100: A regular tightly wound spiral system with a small nucleus. The outer region with a lower surface brightness is probably seen more face-on as the HI kinematics reveals a warp.

UGC 7094: Dwarf.

NGC 4102: Classified as a LINER, this galaxy shows a bright central bar from which two tightly wound dusty spiral arms emerge which almost form a closed ring. HI is seen in absorption against a bright central radio source. Note the bright foreground star at the western edge.

NGC 4111: An edge-on S0 with a less pronounced bulge than NGC 4026 overall. However the central $4''$ core is the most luminous of any galaxy in the sample. There is a very bright star just off the CCD.

NGC 4117: Companion to NGC 4118. The isophotes show some twisting probably due to the gravitational influence of NGC 4118.

NGC 4118: Companion to NGC 4117.

UGC 7129: Note the small bar inside the diffuse disk. Comparable to NGC 3870.

NGC 4138: Note the rings of various surface brightness, apparently offset from the center.

NGC 4143: Lenticular.

UGC 7176: Faint, edge-on.

NGC 4157: There is an obvious dust lane in the nearly edge-on spiral.

UGC 7218: Note the bright rim at the eastern edge of this dwarf. The western side is more diffuse. There is a foreground star at the western edge.

NGC 4183: A nearly edge-on system with a possible warp comparable to NGC 4100.

NGC 4218: There is a bright star just off the CCD which somewhat corrupts the background.

NGC 4217: Note the obvious dust lane in this nearly edge-on system. There are many bright stars close to this galaxy.

NGC 4220: There seems to be a high surface brightness ring in this S0 galaxy.

UGC 7301: Faint, edge-on.

UGC 7401: There is a bright star at the eastern edge of this faint dwarf galaxy.

NGC 4346: Lenticular.

NGC 4389: A bar dominated system with a diffuse extended halo.

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Table 1:: Properties of Three Nearby Clusters

Properties	Virgo	Fornax	Ursa Major
No. E/S0	66	19	9
No. S/Ir	91	16	53
Distance	15.6 Mpc	14.5 Mpc	15.5 Mpc
Vel. dispersion	715 km s^{-1}	434 km s^{-1}	148 km s^{-1}
Virial radius	0.73 Mpc	0.27 Mpc	0.88 Mpc
Crossing time	0.08 H_0^{-1}	0.07 H_0^{-1}	0.5 H_0^{-1}
Log luminosity	12.15	11.40	11.62
Log mass	14.94	14.10	13.64

Table 2:: Cluster Members

PGC	Name	R.A. (1950)	Dec. (1950)	Galactic Long.	Galactic Lat.	Supergalactic SLG	Supergalactic SLB	Type	A_B^b	V_{hel} (km s^{-1})	V_0 (km s^{-1})	Error (km s^{-1})	W_{20} (km s^{-1})	Error (km s^{-1})	H I flux (Jy km s^{-1})
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
34971	UGC 6399	11 20 35.9	51 10 09	152.08	60.96	62.02	−1.53	9	0.00	805	873	20	173	20	···
35202	UGC 6446[q]	11 23 52.9	54 01 21	147.56	59.14	59.72	0.22	7	0.00	644	727	8	157	10	43.4
35616	NGC 3718[q]	11 29 49.9	53 20 39	147.01	60.22	60.71	0.72	1	0.00	989	1070	3	481	5	114.0
35676	NGC 3726	11 30 38.7	47 18 20	155.38	64.88	66.21	−1.79	5	0.01	863	916	5	294	6	92.7
35711	NGC 3729[q]	11 31 04.9	53 24 08	146.64	60.28	60.74	0.91	2	0.00	1064	1146	10	279	15	25.0
35999	NGC 3769	11 35 02.8	48 10 10	152.72	64.75	65.74	−0.75	3	0.00	735	794	7	263	8	46.5
36008	1135+48	11 35 09.2	48 09 31	152.71	64.77	65.75	−0.74	9	0.00	685	744	95	···	···	···
36136	NGC 3782	11 36 40.2	46 47 25	154.44	65.96	67.12	−1.07	6	0.01	739	792	9	136	9	27.4
36136.1	1136+46[f]	11 36 28.8	46 58 00	154.22	65.80	66.93	−1.03	10	0.01	836	890	10	···	···	···
36136.2	1137+46[f]	11 37 08.3	46 53 49	154.13	65.93	67.04	−0.96	10	0.01	702	755	10	···	···	···
36188	UGC 6628	11 37 25.7	46 13 10	155.17	66.47	67.69	−1.19	9	0.01	850	900	6	56	6	23.8
36343	UGC 6667	11 39 45.3	51 52 32	146.27	62.29	62.67	1.47	6	0.00	978	1055	14	198	14	9.9
36528	UGC 6713[f]	11 41 45.5	49 06 52	149.31	64.72	65.33	0.65	9	0.01	899	964	6	107	6	13.4
36686	NGC 3870	11 43 17.5	50 28 40	147.02	63.75	64.17	1.42	0	0.00	758	830	8	121	8	5.7
36699	NGC 3877	11 43 29.3	47 46 21	150.72	65.96	66.68	0.38	5	0.01	901	961	7	357	8	23.8
36825	UGC 6773	11 45 22.1	50 05 12	146.89	64.27	64.67	1.57	9	0.00	923	994	7	119	7	5.3
36875	NGC 3893	11 46 00.2	48 59 20	148.15	65.23	65.73	1.24	5	0.02	970	1036	5	312	5	75.4
36897	NGC 3896	11 46 18.6	48 57 10	148.10	65.29	65.78	1.27	9	0.02	980	1046	50	···	···	···
36953	NGC 3906	11 47 02.6	48 42 15	148.21	65.56	66.05	1.29	7	0.03	960	1025	7	55	8	4.5
36990	UGC 6805[f]	11 47 35.5	42 21 11	158.91	70.51	71.96	−1.05	0	0.00	1033	1069	50	···	···	···
37024	NGC 3913[q]	11 48 00.6	55 37 54	140.11	59.70	59.68	4.05	7	0.00	955	1052	5	63	5	12.8
37036	NGC 3917	11 48 07.7	52 06 09	143.65	62.79	62.97	2.74	6	0.01	968	1049	5	295	6	23.3
37037	UGC 6816[q]	11 48 09.3	56 44 02	139.11	58.73	58.67	4.48	9	0.00	890	992	7	141	7	13.1
37038	UGC 6818	11 48 10.1	46 05 09	151.76	67.78	68.54	0.47	7	0.00	812	866	12	176	12	15.4
37045	1148+48[f]	11 48 12.9	48 31 46	148.04	65.80	66.28	1.40	10	0.03	768	833	10	···	···	···
37073	NGC 3931	11 48 35.9	52 16 44	143.32	62.68	62.83	2.88	−3	0.01	928	1010	26	···	···	···
37136	NGC 3928	11 49 10.8	48 57 41	147.17	65.54	65.94	1.71	1	0.04	982	1049	10	128	10	3.8
37164	UGC 6840[f]	11 49 29.8	52 23 10	142.94	62.66	62.79	3.04	9	0.00	1018	1101	8	155	8	14.7
37217	NGC 3924[f]	11 50 02.8	50 19 00	145.15	64.48	64.74	2.35	9	0.01	999	1073	11	111	11	5.7
37229	NGC 3938	11 50 13.2	44 23 56	153.87	69.32	70.24	0.17	5	0.00	808	855	5	115	5	78.9
37290	NGC 3949	11 51 05.5	48 08 14	147.63	66.40	66.83	1.70	4	0.03	799	863	6	285	6	41.4
37306	NGC 3953	11 51 12.4	52 36 18	142.21	62.59	62.68	3.36	4	0.01	1054	1139	5	426	5	34.4
37418	UGC 6894[q]	11 52 47.3	54 56 08	139.52	60.63	60.59	4.43	6	0.00	767	863	15	159	15	5.1
37466	NGC 3972[q]	11 53 09.0	55 35 56	138.85	60.06	59.98	4.72	4	0.00	843	942	11	266	11	14.7
37520	NGC 3982[q]	11 53 52.4	55 24 12	138.83	60.27	60.21	4.74	3	0.00	1108	1206	7	232	7	22.2
37525	UGC 6917	11 53 53.1	50 42 27	143.46	64.45	64.61	3.06	7	0.03	917	994	8	202	8	27.4
37542	NGC 3985	11 54 06.4	48 36 48	145.94	66.27	66.56	2.34	9	0.05	950	1018	8	179	10	13.4
37550	UGC 6922	11 54 16.7	51 05 41	142.91	64.14	64.26	3.26	6	0.04	885	964	7	154	7	8.5
37553	UGC 6923	11 54 14.4	53 26 19	140.51	62.06	62.07	4.09	8	0.00	1066	1155	6	174	6	9.7

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PGC	Name	R.A. (1950)	Dec. (1950)	Galactic Long.	Galactic Lat.	Supergalactic SLG	Supergalactic SLB	Type	A_B^b	V_{hel} (km s^{-1})	V_0 (km s^{-1})	Error (km s^{-1})	W_{20} (km s^{-1})	Error (km s^{-1})	H I flux (Jy km s^{-1})
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
37584	UGC 6930	11 54 42.3	49 33 41	144.54	65.51	65.71	2.77	7	0.06	779	851	8	139	8	43.4
37617	NGC 3992	11 55 00.9	53 39 11	140.09	61.92	61.91	4.27	4	0.00	1049	1140	4	479	5	64.1
37618	NGC 3990[q]	11 55 00.3	55 44 13	138.25	60.04	59.95	5.01	−2	0.00	720	820	43	···	···	···
37621	UGC 6940[f]	11 55 12.4	53 30 46	140.17	62.06	62.05	4.25	6	0.00	1112	1202	10	112	10	2.7
37642	NGC 3998[q]	11 55 21.0	55 43 55	138.17	60.06	59.93	5.08	−3	0.00	1040	1140	50	617	50	6.4
37682	UGC 6956[f]	11 55 50.8	51 11 44	142.31	64.17	64.25	3.53	9	0.04	916	996	6	73	9	6.0
37691	NGC 4013	11 55 56.8	44 13 31	151.86	70.09	70.77	1.06	3	0.00	836	884	7	407	10	36.9
37692	UGC 6962	11 55 59.5	43 00 44	154.08	71.05	71.91	0.63	6	0.00	784	827	20	···	···	9.3
37697	NGC 4010	11 56 02.0	47 32 16	146.68	67.36	67.69	2.26	7	0.00	905	968	8	276	8	36.1
37700	UGC 6969	11 56 12.9	53 42 11	139.70	61.96	61.92	4.46	9	0.00	1113	1204	7	152	7	6.4
37719	UGC 6973	11 56 17.8	43 00 03	153.97	71.10	71.94	0.68	2	0.00	713	756	90	···	···	18.5
37722	1156+46[f]	11 56 18.8	46 00 46	148.78	68.67	69.13	1.76	10	0.00	1154	1210	10	65	10	6.0
37735	UGC 6983	11 56 34.9	52 59 08	140.27	62.62	62.61	4.26	6	0.01	1079	1167	7	198	8	37.8
37760	NGC 4026	11 56 50.7	51 14 24	141.94	64.20	64.27	3.68	−2	0.04	878	959	75	···	···	···
37832	UGC 6992[f]	11 57 44.8	50 55 50	141.98	64.54	64.61	3.71	10	0.02	749	829	10	···	···	···
38068	NGC 4051	12 00 36.4	44 48 36	148.88	70.08	70.51	2.04	4	0.00	704	757	7	267	8	40.5
38283	NGC 4085	12 02 50.4	50 37 54	140.59	65.17	65.16	4.37	5	0.01	750	830	7	304	8	21.7
38302	NGC 4088	12 03 02.0	50 49 03	140.33	65.01	65.00	4.46	4	0.01	758	839	5	373	5	111.5
38356	UGC 7089	12 03 25.4	43 25 18	149.90	71.52	71.99	2.05	8	0.00	777	825	7	159	7	16.5
38356.1	1203+43[f]	12 03 26.8	43 10 52	150.30	71.73	72.23	1.97	10	0.00	756	833	15	···	···	···
38370	NGC 4100	12 03 36.4	49 51 41	141.11	65.92	65.93	4.23	4	0.04	1073	1150	8	404	10	41.4
38375	UGC 7094	12 03 38.5	43 14 05	150.14	71.70	72.19	2.02	8	0.00	780	827	20	112	20	6.0
38392	NGC 4102	12 03 51.3	52 59 22	138.08	63.07	62.99	5.29	2	0.01	838	929	11	328	11	8.7
38440	NGC 4111	12 04 31.0	43 20 40	149.53	71.69	72.13	2.20	−1	0.00	801	849	11	327	15	9.3
38503	NGC 4117	12 05 14.2	43 24 17	149.07	71.72	72.13	2.35	−2	0.00	958	1006	50	···	···	···
38507	NGC 4118[f]	12 05 20.9	43 23 24	149.04	71.74	72.15	2.36	10	0.00	661	709	15	···	···	···
38582	UGC 7129	12 06 23.6	42 01 08	151.00	72.99	73.47	2.11	1	0.00	927	970	50	···	···	···
38643	NGC 4138	12 06 58.6	43 57 49	147.29	71.40	71.70	2.83	1	0.00	878	930	10	329	10	18.1
38654	NGC 4143	12 07 04.6	42 48 44	149.18	72.40	72.79	2.47	−2	0.00	784	830	100	···	···	···
38781	UGC 7176[f]	12 08 25.0	50 33 57	138.70	65.58	65.51	5.18	10	0.02	888	970	30	115	30	7.2
38795	NGC 4157	12 08 34.2	50 45 47	138.47	65.41	65.33	5.27	3	0.02	770	853	8	425	8	111.5
38951	UGC 7218[f]	12 10 27.2	52 32 36	136.37	63.84	63.71	6.09	10	0.02	779	870	12	112	12	5.3
38988	NGC 4183	12 10 46.5	43 58 33	145.39	71.73	71.90	3.48	6	0.00	933	986	7	256	7	47.5
39237	NGC 4218	12 13 17.4	48 24 36	138.88	67.88	67.81	5.27	9	0.00	720	794	9	156	8	7.4
39241	NGC 4217	12 13 21.6	47 22 11	139.90	68.85	68.82	4.96	3	0.00	1025	1095	10	430	17	40.5
39285	NGC 4220	12 13 42.8	48 09 41	138.94	68.13	68.07	5.26	1	0.00	932	1005	15	372	15	3.0
39344	UGC 7301[f]	12 14 13.2	46 21 24	140.62	69.84	69.84	4.79	7	0.00	707	773	9	163	10	8.5
39864	UGC 7401[f]	12 18 21.4	48 06 22	137.02	68.45	68.36	5.98	10	0.00	741	816	10	72	10	1.8
40228	NGC 4346	12 21 01.2	47 16 15	136.57	69.39	69.30	6.17	−2	0.00	770	843	28	···	···	···
40537	NGC 4389	12 23 08.8	45 57 41	136.73	70.74	70.65	6.16	4	0.00	712	780	8	192	8	6.6

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PGC	Name	R.A. (1950)	Dec.	Galactic Long.	Galactic Lat.	Supergalactic SLG	Supergalactic SLB	Type	A_B^b	V_{hel} (km s^{-1})	V_0 (km s^{-1})	Error (km s^{-1})	W_{20} (km s^{-1})	Error (km s^{-1})	H I flux (Jy km s^{-1})
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)

[f] = fainter than complete-sample limit

[q] = questioned membership

1148+48 = Mkn 1460; 1156+46 = UGCA 259

Table 3:: Instrumental Setups for the Various Observing Runs

Date	Telescope	Filter	Detector	Pixel Size	# Frames
1984 Feb 3,4	0.61m f3.1	B, R, I	TI500	1.603	9
1984 Dec 31	0.61m f3.1	B, R, I	TI500	1.630	9
1985 Dec 14	0.61m f3.1	B, R, I	TI500	1.620	6
1986 Mar 6-9	2.24m f2.3	B, R, I	TI500	0.598	53
1990 Apr 22,23	2.24m f2.3	B, R, I	TI800	0.586	34
1991 May 19	2.24m f3.2	B, R, I	TI800	0.424	20
1991 May 14-18	0.61m f6.8	K'	NICMOS256	2.052	30
1992 Feb 15	2.24m f5	K'	NICMOS256	0.753	4
1992 May 25	2.24m f10	B, R, I	Tek1024	0.220	13
1993 Mar 3-5	2.24m f5	K'	NICMOS256	0.753	36
1994 Feb 4	2.24m f10	B, R, I	Tek2048	0.220	12
1995 Feb 2,4-6	2.24m f10	B, R, I	Tek2048	0.220	98
1996 Mar 24	2.24m f10	B, R, I	Tek2048	0.220	41

Table 4:: Raw Photometric Data

PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes $m_{\rm iso}$	$m_{\rm tot}$	Surface Brightness μ_4 (mag/arcsec^2)	μ_0	Dimensions h (arcsec)	R_{20}	R_{50}	R_{80}
34971	9	B	08 Mar 86	14.38	14.33	22.37	21.83	24.2	21.6	39.8	64.5
UGC 6399	140	R	08 Mar 86	13.36	13.31	21.22	20.79	24.0	20.0	39.1	65.7
	0.724	I	05 Feb 95	12.93	12.88	20.42	20.28	23.1	18.5	37.5	64.7
	72	K	04 Mar 93	11.16	11.09	19.04	18.72	26.3	20.4	38.7	63.6
35202	7	B	24 Mar 96	13.61	13.52	22.19	22.61	34.8	25.1	51.1	90.8
UGC 6446	20	R	24 Mar 96	12.90	12.81	21.19	21.66	30.9	20.2	46.4	85.8
	0.384	I	05 Feb 95	12.68	12.58	20.88	21.25	27.9	18.0	42.7	79.5
	68	K	03 Mar 93	11.60	11.50	19.31	19.31	19.6	13.6	31.8	52.9
35616	1	B	04 Feb 84	11.33	11.28	20.97	21.88	80.4	56.4	124.6	216.7
NGC 3718	15	R	04 Feb 84	9.98	9.95	18.23	20.36	70.7	41.9	102.9	196.7
	0.577	I	04 Feb 84	9.32	9.29	17.13	19.67	68.8	35.7	96.0	191.1
	226	K	17 May 91	7.50	7.47	14.17	17.52	56.6	16.4	63.8	134.0
35676	5	B	02 Feb 95	11.03	11.00	19.16	21.07	58.1	45.5	84.6	130.2
NGC 3726	14	R	02 Feb 95	9.99	9.97	18.27	19.87	52.1	41.0	79.4	127.8
	0.384	I	02 Feb 95	9.53	9.51	17.83	19.23	47.3	37.9	74.1	120.3
	175	K	15 May 91	7.98	7.96	16.10	17.19	37.9	31.6	62.0	99.6
35711	2	B	09 Mar 86	12.32	12.31	20.48	20.22	19.4	18.6	34.4	61.1
NGC 3729	164	R	09 Mar 86	10.95	10.94	18.61	18.97	20.1	17.6	35.0	62.5
	0.318	I	09 Mar 86	10.31	10.30	18.02	18.50	21.6	17.8	36.2	64.3
	84	K	16 May 91	8.61	8.60	15.92	16.44	18.5	14.3	31.1	53.2
35999	3	B	19 May 91	12.81	12.80	20.22	19.93	19.0	15.6	29.9	53.4
NGC 3769	150	R	19 May 91	11.57	11.56	18.84	18.85	20.3	15.2	30.5	56.9
	0.691	I	19 May 91	11.00	10.99	18.28	18.33	20.7	15.2	30.8	58.0
	89	K	03 Mar 93	9.11	9.10	16.28	16.34	19.6	14.7	29.9	58.5
36008	9	B	19 May 91	14.97	14.95	21.28	20.68	9.6	8.6	15.7	29.5
1135+48	114	R	19 May 91	14.07	14.05	20.44	19.94	10.5	9.0	16.8	31.8
	0.691	I	19 May 91	13.64	13.61	20.12	19.65	11.2	9.6	18.6	36.1
	37	K	03 Mar 93	12.05	11.98	19.05	18.83	13.7	13.8	32.2	55.2
36136	6	B	06 Feb 95	13.23	13.22	20.64	20.34	11.8	10.3	20.0	32.0
NGC 3782	12	R	06 Feb 95	12.53	12.51	19.73	19.59	11.6	9.1	19.0	33.0
	0.245	I	06 Feb 95	12.22	12.20	19.30	18.99	10.3	8.3	17.4	29.2
	45	K	15 Feb 92	10.56	10.54	17.63	17.31	10.2	8.2	17.3	29.9
36136.1	10	B	02 Feb 95	16.57	16.53	22.46	21.72	4.9	3.9	8.5	14.4
1136+46	25	R	02 Feb 95	15.54	15.50	21.12	20.54	4.6	3.1	7.3	13.7
	0.212	I	02 Feb 95	15.08	15.04	20.57	20.07	4.6	2.8	7.0	13.4
	16	K	…	…	…	…	…	…	…	…	…
36136.2	10	B	02 Feb 95	16.58	16.54	22.58	21.72	4.9	4.3	8.3	13.7
1137+46	117	R	02 Feb 95	15.81	15.74	22.04	21.36	6.0	5.0	9.6	16.8
	0.257	I	02 Feb 95	15.43	15.34	21.73	21.07	6.4	5.2	9.9	17.4
	15	K	…	…	…	…	…	…	…	…	…

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes m_{iso}	m_{tot}	Surface Brightness μ_4 (mag/arcsec^2)	μ_0	Dimensions h (arcsec)	R_{20}	R_{50}	R_{80}
36188	9	B	06 Feb 95	13.24	13.17	22.17	22.39	29.2	25.8	49.8	79.8
UGC 6628	42	R	06 Feb 95	12.35	12.26	21.24	21.68	31.7	25.1	50.8	83.2
	0.060	I	06 Feb 95	12.13	12.05	20.81	20.99	25.6	21.7	45.1	74.0
	82	K	...	...	...	...	...	...	...	...	...
36343	6	B	08 Mar 86	14.37	14.33	22.24	21.50	31.3	30.8	58.0	98.0
UGC 6667	88	R	08 Mar 86	13.14	13.11	20.82	20.38	32.6	30.0	58.1	100.5
	0.878	I	05 Feb 95	12.66	12.63	20.13	19.89	32.8	28.3	56.0	95.1
	103	K	15 Feb 92	10.85	10.81	18.03	18.16	32.5	25.5	54.4	101.6
36528	9	B	22 Apr 90	14.98	14.90	22.80	22.42	13.8	12.4	24.4	37.4
UGC 6713	124	R	22 Apr 90	13.96	13.88	21.70	21.50	14.7	12.0	24.2	39.0
	0.171	I	06 Feb 95	13.56	13.47	21.59	21.16	15.0	12.1	23.5	38.4
	37	K	03 Mar 93	11.67	11.55	19.59	19.54	17.5	13.7	28.7	50.7
36686	0	B	07 Mar 86	13.69	13.67	18.89	20.76	9.3	2.4	7.3	18.3
NGC 3870	17	R	07 Mar 86	12.73	12.71	18.15	19.87	10.0	3.0	8.6	21.2
	0.305	I	07 Mar 86	12.18	12.16	17.79	19.45	11.3	3.5	10.3	25.5
	34	K	05 Mar 93	10.75	10.73	16.20	17.04	7.1	3.1	7.6	17.2
36699	5	B	24 Mar 96	11.92	11.91	18.93	19.72	33.4	35.6	68.6	108.4
NGC 3877	36	R	24 Mar 96	10.47	10.46	17.67	18.28	32.9	32.2	65.5	106.0
	0.775	I	24 Mar 96	9.73	9.72	17.01	17.50	32.2	30.8	63.7	104.3
	162	K	15 May 91	7.76	7.75	15.74	15.50	31.4	28.2	57.9	93.4
36825	9	B	24 Mar 96	14.46	14.42	22.24	21.67	15.0	12.9	24.5	41.7
UGC 6773	161	R	24 Mar 96	13.65	13.61	21.21	20.70	14.2	12.2	23.6	40.1
	0.470	I	24 Mar 96	13.19	13.15	20.69	20.21	14.0	12.0	23.5	39.8
	46	K	03 Mar 93	11.30	11.23	19.04	18.79	16.5	14.4	30.7	61.1
36875	5	B	06 Feb 95	11.21	11.20	19.07	19.88	25.8	18.7	42.7	80.3
NGC 3893	172	R	06 Feb 95	10.20	10.19	17.81	19.08	27.6	17.2	41.8	82.7
	0.331	I	06 Feb 95	9.72	9.71	17.23	18.59	27.3	16.5	40.9	82.5
	118	K	16 May 91	7.85	7.84	15.27	16.71	27.2	14.3	36.8	77.1
36897	9	B	06 Feb 95	13.79	13.75	20.02	21.70	15.8	5.7	17.5	41.0
NGC 3896	128	R	06 Feb 95	13.01	12.96	19.52	20.90	16.5	7.0	20.0	42.9
	0.331	I	06 Feb 95	12.53	12.47	19.21	20.50	17.2	8.1	22.8	48.7
	48	K	05 Mar 93	11.40	11.35	17.68	18.37	11.1	5.5	13.5	26.1
36953	7	B	06 Feb 94	13.68	13.66	21.53	20.79	10.8	11.3	23.6	37.1
NGC 3906	38	R	06 Feb 94	12.64	12.62	20.43	19.73	10.8	10.7	22.9	37.1
	0.049	I	06 Feb 94	12.09	12.07	19.87	19.32	11.5	10.6	23.3	37.8
	48	K	04 Mar 93	10.61	10.57	18.17	18.08	13.6	9.4	20.1	34.4
36990	0	B	19 May 91	14.91	14.90	19.95	19.30	3.4	1.9	4.7	9.6
UGC 6805	120	R	19 May 91	13.76	13.75	18.85	18.19	3.4	2.0	4.9	9.8
	0.212	I	19 May 91	13.23	13.22	18.43	17.76	3.5	2.2	5.4	10.6
	18	K	05 Mar 93	11.62	11.61	16.57	15.52	2.7	1.7	4.1	7.6

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes $m_{\rm iso}$	$m_{\rm tot}$	Surface Brightness μ_4 (mag/arcsec^2)	μ_0	Dimensions h (arcsec)	R_{20}	R_{50}	R_{80}
37024	7	B	02 Feb 95	13.33	13.27	20.83	22.21	24.0	12.8	32.4	63.0
NGC 3913	165	R	02 Feb 95	12.37	12.29	19.69	21.43	25.4	11.2	31.1	63.7
	0.073	I	02 Feb 95	12.00	11.94	19.18	20.70	21.4	9.9	27.3	57.5
	68	K	04 Mar 93	10.39	10.30	17.33	19.09	20.8	8.4	23.0	49.7
37036	6	B	04 Feb 95	12.68	12.66	21.00	20.59	32.2	37.6	69.0	105.5
NGC 3917	77	R	04 Feb 95	11.44	11.42	19.52	19.39	32.5	34.0	65.3	103.5
	0.758	I	04 Feb 95	10.86	10.85	18.93	18.58	29.8	32.4	62.3	99.2
	140	K	16 May 91	9.10	9.08	17.13	17.12	34.4	28.6	54.1	84.6
37037	9	B	08 Mar 86	14.39	14.31	22.81	22.45	19.5	15.2	33.5	51.0
UGC 6816	39	R	08 Mar 86	13.71	13.62	21.95	21.67	18.9	14.4	32.1	50.4
	0.257	I	08 Mar 86	13.17	13.07	21.47	21.32	21.6	15.1	32.8	50.6
	51	K	15 Feb 92	12.09	11.91	20.18	20.01	19.8	13.7	30.3	47.8
37038	7	B	06 Feb 94	14.47	14.43	21.95	21.62	21.1	17.1	35.3	55.3
UGC 6818	77	R	06 Feb 94	13.66	13.62	20.94	20.63	19.2	15.7	32.4	53.3
	0.724	I	06 Feb 94	13.19	13.15	20.44	20.17	19.3	15.5	32.1	53.6
	66	K	04 Mar 93	11.76	11.70	18.90	18.68	19.5	14.1	28.4	48.3
37045	10	B	06 Feb 94	17.00	16.98	21.41	20.70	2.5	1.1	2.7	6.5
1148+48	31	R	06 Feb 94	16.15	16.12	20.75	20.03	2.8	1.3	3.5	8.0
	0.293	I	06 Feb 94	15.82	15.79	20.48	19.81	3.0	1.4	3.8	8.9
	9	K	...	...	...	...	...	...	...	...	...
37073	−3	B	06 Feb 94	14.23	14.19	20.28	21.55	11.5	4.7	13.4	27.4
NGC 3931	155	R	06 Feb 94	12.87	12.84	18.85	20.15	11.2	4.4	12.9	26.6
	0.191	I	06 Feb 94	12.20	12.17	18.19	19.50	11.2	4.4	12.9	26.7
	34	K	04 Mar 93	10.61	10.59	16.10	17.09	7.9	2.3	9.7	20.5
37136	1	B	19 May 91	13.31	13.29	18.99	20.68	10.2	2.7	10.0	25.1
NGC 3928	20	R	19 May 91	11.95	11.93	17.78	19.89	13.0	3.0	11.6	29.2
	0.039	I	05 Feb 95	11.44	11.42	17.29	19.12	11.9	3.1	11.9	28.0
	42	K	05 Mar 93	9.65	9.63	15.15	16.90	9.3	2.1	8.1	21.3
37164	9	B	22 Apr 90	14.60	14.39	22.18	23.73	29.1	12.2	37.4	66.6
UGC 6840	53	R	22 Apr 90	13.55	13.35	21.25	22.67	29.2	13.2	37.7	67.0
	0.152	I	05 Feb 95	12.97	12.75	20.81	22.28	32.5	14.9	39.7	69.7
	30	K	05 Mar 93	12.25	11.86	19.26	21.03	25.0	8.7	22.1	44.9
37217	9	B	22 Apr 90	14.93	14.83	22.94	22.74	17.7	13.4	25.5	38.7
NGC 3924	105	R	22 Apr 90	13.98	13.88	21.88	21.75	17.1	12.7	24.9	39.6
	0.171	I	22 Apr 90	13.62	13.52	21.43	21.30	16.2	12.0	24.1	39.1
	39	K	04 Mar 93	12.03	11.88	19.77	19.75	17.1	11.9	23.4	37.5
37229	5	B	04 Feb 95	11.00	10.98	19.76	20.99	44.1	31.6	65.3	110.8
NGC 3938	22	R	04 Feb 95	10.00	9.98	18.37	19.83	39.6	26.9	60.0	106.1
	0.117	I	04 Feb 95	9.55	9.53	17.76	19.22	36.5	23.7	55.0	97.3
	154	K	17 May 91	7.84	7.82	15.91	17.16	31.1	19.1	44.8	79.8

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes m_{iso}	m_{tot}	Surface Brightness (mag/arcsec^2) μ_4	μ_0	Dimensions – – – – – (arcsec) – – – – – h	R_{20}	R_{50}	R_{80}
37290	4	B	04 Feb 95	11.56	11.55	18.91	19.54	18.7	14.9	28.8	48.1
NGC 3949	117	R	04 Feb 95	10.70	10.69	17.84	18.92	20.3	13.1	28.2	49.7
	0.384	I	04 Feb 95	10.29	10.28	17.35	18.45	19.9	12.1	27.5	48.8
	87	K	16 May 91	8.44	8.43	15.76	16.55	19.3	12.4	28.8	59.0
37306	4	B	04 Feb 95	11.05	11.03	18.86	20.43	42.9	34.3	78.8	130.6
NGC 3953	13	R	04 Feb 95	9.67	9.66	17.10	19.08	42.5	27.7	71.0	126.6
	0.500	I	04 Feb 95	9.03	9.02	16.37	18.34	40.6	25.2	66.5	121.8
	183	K	15 May 91	7.04	7.03	14.48	16.47	42.7	23.5	61.8	113.5
37418	6	B	22 Apr 90	15.29	15.27	21.56	20.36	11.2	12.1	23.1	36.8
UGC 6894	89	R	22 Apr 90	14.34	14.31	20.71	20.02	14.4	12.7	24.9	40.4
	0.844	I	22 Apr 90	14.02	14.00	20.43	19.45	13.0	12.8	24.7	39.4
	50	K	05 Mar 93	12.45	12.40	18.82	18.33	16.7	12.7	24.2	38.4
37466	4	B	02 Feb 95	13.10	13.09	20.94	20.23	22.9	27.3	50.0	76.4
NGC 3972	118	R	02 Feb 95	11.91	11.90	19.51	19.21	23.9	24.9	48.4	76.2
	0.724	I	02 Feb 95	11.35	11.34	18.89	18.53	22.9	23.8	47.1	74.3
	103	K	03 Mar 93	9.40	9.39	16.64	16.50	21.7	20.2	42.1	67.2
37520	3	B	22 Apr 90	12.27	12.26	19.58	19.27	10.6	9.9	17.8	31.0
NGC 3982	22	R	22 Apr 90	11.21	11.20	18.14	18.45	11.4	8.8	17.6	31.6
	0.109	I	22 Apr 90	10.78	10.77	17.66	17.74	10.4	8.2	17.1	30.4
	54	K	05 Mar 93	8.82	8.81	15.40	15.62	9.7	7.3	15.9	28.8
37525	7	B	07 Mar 86	13.22	13.15	21.90	22.27	37.4	28.9	57.1	94.0
UGC 6917	123	R	07 Mar 86	12.23	12.16	20.72	21.26	36.2	26.0	54.9	90.9
	0.455	I	05 Feb 95	11.81	11.74	20.19	20.72	34.0	25.2	52.4	87.9
	95	K	03 Mar 93	10.39	10.30	18.54	19.17	32.2	21.0	45.4	76.6
37542	9	B	02 Feb 95	13.26	13.25	20.53	20.04	10.5	9.1	16.7	25.3
NGC 3985	70	R	02 Feb 95	12.27	12.26	19.59	19.20	11.4	9.4	17.5	28.0
	0.371	I	02 Feb 95	11.82	11.81	19.18	18.62	10.9	9.5	17.5	27.8
	42	K	16 May 91	10.21	10.19	17.41	17.06	12.6	9.3	17.9	29.6
37550	6	B	22 Apr 90	14.57	14.52	21.61	21.91	13.1	8.4	20.1	40.0
UGC 6922	71	R	22 Apr 90	13.70	13.65	20.46	20.78	11.7	6.8	16.9	34.7
	0.161	I	22 Apr 90	13.27	13.22	19.96	20.25	11.2	6.5	16.0	32.6
	34	K	05 Mar 93	11.94	11.90	18.24	18.19	7.9	4.9	11.7	23.0
37553	8	B	08 Mar 86	13.94	13.91	20.69	21.06	16.6	10.2	25.3	49.8
UGC 6923	174	R	08 Mar 86	13.00	12.97	19.81	20.22	17.5	10.8	26.8	53.9
	0.577	I	08 Mar 86	12.39	12.36	19.38	19.88	20.0	12.9	32.5	65.6
	59	K	04 Mar 93	11.07	11.04	17.74	17.87	14.6	9.8	23.2	43.9
37584	7	B	09 Mar 86	12.76	12.70	21.55	22.09	32.9	24.3	50.5	85.2
UGC 6930	39	R	09 Mar 86	11.77	11.71	20.33	21.09	32.4	22.0	48.6	84.2
	0.143	I	05 Feb 95	11.45	11.39	19.89	20.62	29.9	19.8	44.8	78.9
	90	K	16 May 91	10.42	10.33	18.32	19.14	26.5	13.0	31.0	48.9

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes $m_{\rm iso}$	$m_{\rm tot}$	Surface Brightness μ_4 (mag/arcsec^2)	μ_0	Dimensions h (arcsec)	R_{20}	R_{50}	R_{80}
37617	4	B	02 Feb 95	10.87	10.86	18.95	20.29	45.7	46.3	102.0	156.8
NGC 3992	68	R	02 Feb 95	9.56	9.55	17.26	18.89	43.3	35.7	91.6	148.8
	0.441	I	02 Feb 95	8.95	8.94	16.57	18.05	39.9	32.1	86.4	143.1
	208	K	14 May 91	7.24	7.23	14.60	16.82	45.9	22.8	70.4	117.4
37618	−2	B	08 Mar 86	13.56	13.53	18.61	21.09	12.8	2.9	9.2	24.8
NGC 3990	40	R	08 Mar 86	12.10	12.08	17.11	19.63	12.7	2.8	8.9	24.3
	0.500	I	24 Mar 96	11.37	11.36	16.43	18.72	11.8	2.9	9.1	23.6
	44	K	04 Mar 93	9.55	9.54	14.47	16.04	8.9	2.6	7.7	20.3
37621	6	B	22 Apr 90	16.48	16.45	21.77	21.28	7.1	5.4	11.1	19.2
UGC 6940	135	R	22 Apr 90	15.70	15.65	21.22	20.82	8.2	6.2	12.7	21.9
	0.724	I	22 Apr 90	15.50	15.44	21.05	20.56	8.1	6.3	12.5	20.8
	25	K	04 Mar 93	14.13	13.99	19.99	19.66	12.3	6.9	12.9	19.6
37642	−3	B	25 May 92	11.75	11.73	17.55	20.63	20.7	3.7	15.9	44.8
NGC 3998	137	R	25 May 92	9.56	9.55	15.41	18.15	18.7	3.9	15.8	44.3
	0.201	I	24 Mar 96	9.30	9.29	15.21	18.25	21.3	4.2	17.7	49.4
	79	K	17 May 91	7.36	7.35	13.34	16.40	22.3	4.3	16.2	47.4
37682	9	B	22 Apr 90	15.36	15.12	23.46	23.88	27.5	17.2	41.5	66.7
UGC 6956	124	R	22 Apr 90	14.05	13.83	22.35	22.76	29.7	19.4	45.3	71.0
	0.281	I	22 Apr 90	14.28	14.07	22.00	22.25	21.0	13.3	32.0	57.1
	21	K	05 Mar 93	12.35	12.07	20.36	20.61	24.1	17.4	38.1	59.7
37691	3	B	24 Mar 96	12.46	12.44	21.96	20.79	38.3	34.8	66.8	124.9
NGC 4013	65	R	24 Mar 96	10.80	10.79	20.39	19.07	35.9	30.1	58.5	113.5
	0.758	I	24 Mar 96	9.96	9.95	18.94	18.15	33.9	26.9	52.9	102.6
	146	K	14 May 91	7.68	7.68	14.85	14.90	22.8	18.6	38.5	70.6
37692	6	B	02 Feb 95	12.90	12.88	21.30	20.52	16.7	19.8	35.3	54.5
UGC 6962	179	R	02 Feb 95	11.90	11.88	20.13	19.59	16.9	18.3	34.2	54.3
	0.201	I	02 Feb 95	11.44	11.42	19.61	18.96	15.8	17.4	33.1	52.3
	70	K	18 May 91	10.15	10.11	18.07	18.07	19.1	13.5	26.4	42.3
37697	7	B	02 Feb 95	13.37	13.36	22.13	20.17	32.1	40.1	73.7	113.1
NGC 4010	65	R	02 Feb 95	12.15	12.14	20.64	19.08	32.6	38.2	70.9	111.3
	0.878	I	02 Feb 95	11.56	11.55	19.91	18.52	32.5	36.3	68.2	108.8
	139	K	04 Mar 93	9.24	9.22	16.96	17.13	38.6	28.5	58.9	113.9
37700	9	B	22 Apr 90	15.15	15.12	22.14	21.28	12.4	12.3	23.1	36.0
UGC 6969	150	R	22 Apr 90	14.36	14.32	21.31	20.63	13.2	12.0	23.1	37.0
	0.691	I	22 Apr 90	14.08	14.04	21.00	20.18	12.3	11.8	22.6	36.2
	45	K	15 Feb 92	12.67	12.58	19.43	19.06	14.9	11.0	21.1	34.2
37719	2	B	02 Feb 95	12.97	12.94	19.56	21.17	22.9	10.1	23.4	55.4
UGC 6973	40	R	02 Feb 95	11.28	11.26	17.55	19.42	21.2	9.1	21.1	47.9
	0.609	I	02 Feb 95	10.54	10.53	16.69	18.50	19.5	8.6	20.2	43.4
	80	K	18 May 91	8.23	8.23	14.28	14.70	11.0	7.0	14.8	28.0

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PGC	Type		Observed	Magnitudes		Surface Brightness		Dimensions			
Name	P.A.		Date	$m_{\rm iso}$	$m_{\rm tot}$	μ_4	μ_0	h	R_{20}	R_{50}	R_{80}
	$1-(b/a)$					(mag/arcsec^2)		– – – – – (arcsec) – – – – –			
	$R(B_{25})$										
37722	10	B	25 May 92	16.90	16.24	25.38	25.17	···	13.7	22.1	27.9
1156+46	21	R	25 May 92	15.70	15.05	24.29	24.16	···	14.8	24.1	31.4
	0.384	I	25 May 92	15.33	14.54	23.98	23.89	···	15.5	24.9	32.1
	9	K	···	···	···	···	···	···	···	···	···
37735	6	B	08 Mar 86	13.19	13.10	21.58	22.59	39.8	26.5	57.6	92.3
UGC 6983	90	R	08 Mar 86	12.35	12.27	20.48	21.54	35.3	22.5	51.6	87.5
	0.344	I	08 Feb 95	12.00	11.91	20.26	21.08	33.2	20.8	48.6	83.8
	96	K	04 Mar 93	10.63	10.52	18.45	19.41	29.5	16.8	39.6	68.3
37760	−2	B	04 Feb 95	11.72	11.71	17.26	19.88	27.8	9.3	29.0	68.2
NGC 4026	177	R	04 Feb 95	10.26	10.25	15.72	18.37	27.0	8.7	27.7	65.8
	0.741	I	04 Feb 95	9.58	9.57	15.37	17.66	26.7	9.4	28.2	66.0
	131	K	18 May 91	7.66	7.65	13.48	15.66	25.8	9.5	26.5	60.6
37832	10	B	24 Mar 96	14.79	14.77	21.88	20.98	10.7	10.2	18.7	31.7
UGC 6992	60	R	24 Mar 96	13.53	13.51	20.60	19.85	11.2	10.2	19.3	33.3
	0.546	I	24 Mar 96	12.95	12.93	19.99	19.27	11.3	10.0	19.0	32.6
	38	K	···	···	···	···	···	···	···	···	···
38068	4	B	04 Feb 95	11.00	10.98	17.94	20.78	46.4	36.5	75.0	129.4
NGC 4051	131	R	04 Feb 95	9.90	9.88	16.92	19.77	47.0	31.3	72.2	130.3
	0.344	I	04 Feb 95	9.39	9.37	16.46	19.26	46.4	28.7	69.6	127.1
	177	K	14 May 91	7.87	7.86	14.34	16.72	30.2	14.0	50.4	85.5
38283	5	B	05 Feb 95	13.10	13.09	20.75	19.67	17.3	19.2	35.5	56.5
NGC 4085	75	R	05 Feb 95	11.88	11.87	18.77	18.48	17.3	16.3	32.6	54.3
	0.758	I	05 Feb 95	11.29	11.28	18.06	17.96	17.6	15.4	31.8	54.0
	84	K	16 May 91	9.21	9.20	15.78	15.82	17.5	12.8	27.0	46.2
38302	4	B	24 Mar 96	11.24	11.23	20.02	19.77	34.0	41.6	77.3	110.9
NGC 4088	51	R	24 Mar 96	10.01	10.00	18.20	18.44	32.6	35.7	70.7	107.4
	0.625	I	24 Mar 96	9.38	9.37	17.35	17.72	31.4	32.6	67.1	104.8
	161	K	16 May 91	7.47	7.46	15.48	16.19	37.0	27.4	59.7	96.0
38356	8	B	04 Feb 95	13.77	13.73	21.65	21.51	32.7	28.3	53.7	93.7
UGC 7089	35	R	04 Feb 95	12.81	12.77	20.70	20.65	34.5	28.1	55.4	100.0
	0.809	I	04 Feb 95	12.40	12.36	20.25	20.15	33.2	26.9	53.4	94.7
	105	K	18 May 91	11.18	11.11	19.01	18.73	34.4	22.1	42.5	68.2
38356.1	10	B	04 Feb 95	16.75	16.65	23.20	22.71	7.4	5.7	10.0	19.6
1203+43	101	R	04 Feb 95	15.93	15.79	22.49	22.18	8.9	6.3	11.9	26.2
	0.305	I	04 Feb 95	15.70	15.57	22.20	21.60	7.5	6.1	11.2	21.2
	15	K	···	···	···	···	···	···	···	···	···
38370	4	B	05 Feb 95	11.92	11.91	19.53	19.82	31.3	37.8	64.7	98.5
NGC 4100	164	R	05 Feb 95	10.63	10.62	18.04	18.54	30.4	31.9	60.3	94.2
	0.708	I	05 Feb 95	10.01	10.00	17.36	17.90	29.9	29.7	58.3	91.9
	157	K	15 May 91	8.03	8.02	15.22	15.77	28.0	25.6	54.5	86.6

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes $m_{\rm iso}$	$m_{\rm tot}$	Surface Brightness μ_4 (mag/arcsec^2)	μ_0	Dimensions h (arcsec)	R_{20}	R_{50}	R_{80}
38375	8	B	04 Feb 95	14.79	14.74	21.76	21.99	19.0	12.7	27.8	58.1
UGC 7094	39	R	04 Feb 95	13.76	13.70	20.87	21.01	19.4	13.2	28.3	57.6
	0.642	I	04 Feb 95	13.28	13.22	20.44	20.55	19.7	13.5	28.8	59.0
	48	K	05 Mar 93	11.64	11.58	18.72	18.56	16.2	12.9	27.6	57.7
38392	2	B	06 Mar 86	12.05	12.04	18.49	19.28	17.1	9.9	34.3	57.5
NGC 4102	38	R	06 Mar 86	10.55	10.54	16.45	18.00	17.5	6.9	28.7	55.6
	0.441	I	05 Feb 95	9.93	9.93	15.70	17.29	16.6	5.9	23.8	52.1
	90	K	16 May 91	7.87	7.86	13.51	16.15	19.7	4.3	14.7	45.3
38440	−1	B	24 Mar 96	11.41	11.40	16.79	19.70	27.3	7.4	23.1	55.7
NGC 4111	150	R	24 Mar 96	9.96	9.95	15.22	18.51	29.0	6.8	21.9	54.5
	0.775	I	24 Mar 96	9.26	9.25	14.60	17.63	27.9	7.0	22.6	55.5
	134	K	18 May 91	7.61	7.60	13.18	15.63	23.9	7.7	19.7	46.2
38503	−2	B	19 May 91	14.08	14.05	19.76	21.16	13.1	5.7	14.1	31.7
NGC 4117	21	R	19 May 91	12.49	12.47	18.08	19.84	14.0	5.3	13.8	32.9
	0.562	I	19 May 91	11.83	11.81	17.44	19.42	15.2	5.3	13.8	34.0
	46	K	05 Mar 93	10.00	9.98	15.34	17.11	12.1	4.3	11.5	27.8
38507	10	B	19 May 91	15.90	15.85	21.17	21.99	7.2	3.1	7.9	18.5
NGC 4118	151	R	19 May 91	14.86	14.82	20.25	20.71	6.8	3.4	8.3	17.7
	0.398	I	19 May 91	14.34	14.29	19.91	20.42	7.5	3.8	9.2	19.7
	19	K	05 Mar 93	12.94	12.89	18.19	18.26	5.7	3.1	7.2	14.0
38582	1	B	24 Mar 96	14.17	14.13	20.62	21.44	12.6	7.1	15.7	32.1
UGC 7129	72	R	24 Mar 96	12.83	12.80	19.36	20.16	13.1	7.5	16.8	34.0
	0.305	I	24 Mar 96	12.21	12.19	18.79	19.25	11.8	7.6	16.5	31.7
	38	K	···	···	···	···	···	···	···	···	···
38643	1	B	25 May 92	12.28	12.27	18.86	20.05	16.1	9.0	21.8	41.7
NGC 4138	151	R	25 May 92	10.73	10.72	17.07	18.80	18.0	8.2	22.5	44.9
	0.371	I	25 May 92	10.10	10.09	16.35	18.18	18.1	7.8	22.2	45.0
	73	K	05 Mar 93	8.20	8.19	14.43	15.98	15.7	6.5	20.0	39.6
38654	−2	B	24 Mar 96	12.07	12.06	17.85	20.34	19.4	5.5	19.0	42.4
NGC 4143	143	R	24 Mar 96	10.56	10.55	16.22	18.65	17.7	4.8	17.3	38.8
	0.455	I	25 May 92	9.84	9.84	15.43	17.32	14.5	4.5	16.3	36.5
	78	K	18 May 91	7.86	7.86	13.71	15.23	13.7	5.2	16.4	36.9
38781	10	B	22 Apr 90	16.36	16.20	23.64	23.37	24.3	15.7	28.3	41.5
UGC 7176	83	R	22 Apr 90	15.85	15.61	23.13	22.91	25.7	16.1	28.7	42.5
	0.741	I	22 Apr 90	15.62	15.35	22.76	22.53	22.4	15.4	27.6	41.6
	40	K	05 Mar 93	15.10	14.65	21.46	21.21	20.0	13.5	23.8	37.9
38795	3	B	14 Dec 85	12.14	12.12	20.44	20.92	55.0	41.8	93.1	152.4
NGC 4157	63	R	14 Dec 85	10.61	10.60	18.33	18.95	44.0	31.9	74.7	127.4
	0.826	I	14 Dec 85	9.89	9.88	17.56	18.24	43.8	29.6	69.8	124.4
	202	K	15 May 91	7.52	7.52	15.28	14.87	28.9	24.4	51.4	87.8

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PGC Name	Type P.A. $1-(b/a)$ $R(B_{25})$		Observed Date	Magnitudes $m_{\rm iso}$	$m_{\rm tot}$	Surface Brightness (mag/arcsec^2) μ_4	μ_0	Dimensions (arcsec) h	R_{20}	R_{50}	R_{80}
38951	10	B	24 Mar 96	14.93	14.88	22.72	21.74	12.1	12.8	21.5	33.5
UGC 7218	172	R	24 Mar 96	14.04	13.99	21.81	20.99	13.2	12.8	22.2	36.4
	0.470	I	24 Mar 96	13.61	13.56	21.30	20.46	12.7	12.4	21.8	35.1
	38	K	04 Mar 93	12.50	12.34	20.14	19.86	25.4	11.7	19.3	27.9
38988	6	B	04 Feb 95	12.98	12.96	20.85	20.66	37.2	37.0	72.6	111.3
NGC 4183	166	R	04 Feb 95	12.01	11.99	19.62	19.68	36.9	33.4	68.7	110.1
	0.861	I	04 Feb 95	11.53	11.51	19.09	19.22	37.3	32.3	67.6	111.3
	143	K	05 Mar 93	9.78	9.76	16.98	17.33	35.3	26.7	57.5	98.9
39237	9	B	24 Mar 96	13.71	13.69	20.29	20.35	9.6	6.6	12.5	20.5
NGC 4218	136	R	24 Mar 96	12.85	12.83	19.37	19.58	10.3	6.6	12.7	21.9
	0.398	I	25 May 92	12.42	12.41	18.94	18.17	7.1	6.5	12.3	20.3
	35	K	05 Mar 93	10.84	10.83	17.34	16.51	7.2	6.4	12.3	21.0
39241	3	B	24 Mar 96	12.18	12.15	21.85	21.03	46.9	44.5	85.4	139.1
NGC 4217	50	R	24 Mar 96	10.64	10.62	19.48	19.36	44.0	39.3	77.6	131.7
	0.741	I	24 Mar 96	9.85	9.84	18.28	18.56	43.4	36.3	73.3	127.3
	170	K	16 May 91	7.62	7.61	15.22	15.70	32.2	23.1	50.5	92.1
39285	1	B	24 Mar 96	12.35	12.34	19.29	20.08	24.7	17.7	37.5	71.2
NGC 4220	140	R	24 Mar 96	10.80	10.79	17.57	18.61	24.9	16.3	36.1	69.2
	0.691	I	24 Mar 96	10.04	10.03	16.75	17.83	24.5	15.9	35.4	67.8
	109	K	18 May 91	8.36	8.36	14.83	15.27	17.1	12.2	27.3	48.1
39344	7	B	22 Apr 90	15.59	15.54	22.19	21.77	17.6	15.4	30.5	47.7
UGC 7301	82	R	22 Apr 90	14.62	14.57	21.17	20.92	18.9	15.4	30.9	51.1
	0.844	I	22 Apr 90	14.31	14.26	20.82	20.34	16.4	14.6	29.0	46.7
	55	K	05 Mar 93	12.80	12.73	19.08	18.86	17.0	13.2	26.4	44.9
39864	10	B	02 Feb 95	15.85	15.74	23.49	22.92	13.9	12.2	23.2	40.6
UGC 7401	16	R	02 Feb 95	14.97	14.83	22.69	22.23	15.5	13.2	25.3	48.5
	0.412	I	02 Feb 95	14.61	14.46	22.23	21.82	15.5	12.8	24.9	45.1
	29	K	...	...	...	...	...	...	...	...	...
40228	−2	B	09 Mar 86	12.16	12.14	17.81	20.53	26.3	7.7	25.6	60.6
NGC 4346	98	R	09 Mar 86	10.70	10.69	16.23	19.05	25.8	7.3	24.8	59.4
	0.674	I	09 Mar 86	9.97	9.96	15.61	18.65	29.7	8.2	28.1	70.5
	104	K	18 May 91	8.22	8.21	13.96	15.91	19.7	7.2	20.8	48.9
40537	4	B	09 Mar 86	12.58	12.56	20.32	20.54	19.0	14.7	33.4	52.5
NGC 4389	96	R	09 Mar 86	11.34	11.33	19.03	19.31	19.3	15.2	34.0	54.0
	0.344	I	05 Feb 95	10.88	10.87	18.58	18.79	18.9	15.2	33.7	53.9
	75	K	15 May 91	9.13	9.12	16.71	16.61	16.0	13.1	30.1	47.8

Table 5:: Reduced Photometric Data

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PGC	Type	B_T^{bi}	R_T^{bi}	I_T^{bi}	K_T^{bi}	$B-R$	$B-I$	$B-K'$	h_R/h_B	h_I/h_B	$h_{K'}/h_B$	$<C_{82}>$	$\log L_B$
Name	Inclin.	M_B^{bi}	M_R^{bi}	M_I^{bi}	M_K^{bi}	$\mu_0^B-\mu_0^R$	$\mu_0^B-\mu_0^I$	$\mu_0^B-\mu_0^{K'}$	$\mu_0^B-\mu_4^B$	$\mu_0^R-\mu_4^R$	$\mu_0^I-\mu_4^I$	$\mu_0^{K'}-\mu_4^{K'}$	$\log L_{K'}$
34971	9	13.55	12.79	12.46	11.03	0.76	1.08	2.52	0.992	0.955	1.087	3.3	9.15
UGC 6399	79	−17.40	−18.16	−18.49	−19.92	1.04	1.55	3.11	−0.54	−0.43	−0.14	−0.32	9.31
35202	7	13.34	12.71	12.50	11.49	0.63	0.84	1.85	0.888	0.802	0.563	4.1	9.24
UGC 6446	54	−17.61	−18.24	−18.45	−19.46	0.95	1.36	3.30	0.42	0.47	0.37	0.00	9.13
35616	1	10.89	9.72	9.11	7.45	1.17	1.78	3.44	0.879	0.856	0.704	4.6	10.22
NGC 3718	68	−20.06	−21.23	−21.84	−23.50	1.52	2.21	4.36	0.91	2.13	2.54	3.35	10.74
35676	5	10.81	9.86	9.43	7.95	0.95	1.38	2.86	0.897	0.814	0.652	3.1	10.25
NGC 3726	54	−20.14	−21.09	−21.52	−23.00	1.20	1.84	3.88	1.91	1.60	1.40	1.09	10.54
35711	2	12.18	10.87	10.25	8.59	1.31	1.94	3.59	1.036	1.113	0.954	3.5	9.70
NGC 3729	48	−18.77	−20.08	−20.70	−22.36	1.25	1.72	3.78	−0.26	0.36	0.48	0.52	10.29
35999	3	12.16	11.15	10.67	9.06	1.01	1.49	3.10	1.068	1.089	1.032	3.6	9.71
NGC 3769	76	−18.79	−19.80	−20.28	−21.89	1.08	1.60	3.59	−0.29	0.01	0.05	0.06	10.10
36008	9	14.31	13.64	13.29	11.94	0.67	1.02	2.37	1.094	1.167	1.427	3.6	8.85
1135+48	76	−16.64	−17.31	−17.66	−19.01	0.74	1.03	1.85	−0.60	−0.50	−0.47	−0.22	8.95
36136	6	13.12	12.45	12.16	10.53	0.67	0.96	2.58	0.983	0.873	0.864	3.4	9.32
NGC 3782	42	−17.83	−18.50	−18.79	−20.42	0.75	1.35	3.03	−0.30	−0.14	−0.31	−0.32	9.51
36136.1	10	16.44	15.45	15.00	···	0.99	1.44	···	0.939	0.939	···	4.3	7.99
1136+46	39	−14.51	−15.50	−15.95	···	1.18	1.65	···	−0.74	−0.58	−0.50	···	···
36136.2	10	16.43	15.68	15.29	···	0.75	1.14	···	1.224	1.306	···	3.3	8.00
1137+46	43	−14.52	−15.27	−15.66	···	0.36	0.65	···	−0.86	−0.68	−0.66	···	···
36188	9	13.14	12.24	12.04	···	0.90	1.10	···	1.086	0.877	···	3.3	9.31
UGC 6628	20	−17.81	−18.71	−18.91	···	0.71	1.40	···	0.22	0.44	0.18	···	···
36343	6	13.49	12.53	12.17	10.75	0.96	1.32	2.75	1.042	1.048	1.038	3.3	9.17
UGC 6667	90	−17.46	−18.42	−18.78	−20.20	1.12	1.61	3.34	−0.74	−0.44	−0.24	0.13	9.43
36528	9	14.83	13.84	13.44	11.55	0.99	1.39	3.28	1.065	1.087	1.268	3.1	8.64
UGC 6713	35	−16.12	−17.11	−17.51	−19.40	0.92	1.26	2.88	−0.38	−0.20	−0.43	−0.05	9.11

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PGC	Type	B_T^{bi}	R_T^{bi}	I_T^{bi}	K_T^{bi}	$B-R$	$B-I$	$B-K'$	h_R/h_B	h_I/h_B	$h_{K'}/h_B$	$<C_{82}>$	$\log L_B$
Name	Inclin.	M_B^{bi}	M_R^{bi}	M_I^{bi}	M_K^{bi}	$\mu_0^B-\mu_0^R$	$\mu_0^B-\mu_0^I$	$\mu_0^B-\mu_0^{K'}$	$\mu_0^B-\mu_4^B$	$\mu_0^R-\mu_4^R$	$\mu_0^I-\mu_4^I$	$\mu_0^{K'}-\mu_4^{K'}$	$\log L_{K'}$
36686	0	13.67	12.71	12.16	10.73	0.96	1.51	2.94	1.075	1.215	0.763	7.3	9.10
NGC 3870	47	−17.28	−18.24	−18.79	−20.22	0.89	1.31	3.72	1.87	1.72	1.66	0.84	9.43
36699	5	11.06	9.88	9.26	7.69	1.18	1.81	3.38	0.985	0.964	0.940	3.2	10.15
NGC 3877	84	−19.89	−21.07	−21.69	−23.26	1.44	2.22	4.22	0.79	0.61	0.49	−0.24	10.65
36825	9	14.17	13.47	13.04	11.22	0.70	1.13	2.95	0.947	0.933	1.100	3.3	8.90
UGC 6773	60	−16.78	−17.48	−17.91	−19.73	0.97	1.46	2.88	−0.57	−0.51	−0.48	−0.25	9.24
36875	5	11.04	10.10	9.64	7.83	0.94	1.40	3.21	1.070	1.058	1.054	4.7	10.15
NGC 3893	49	−19.91	−20.85	−21.31	−23.12	0.80	1.29	3.17	0.81	1.27	1.36	1.44	10.59
36897	9	13.59	12.87	12.40	11.34	0.72	1.19	2.25	1.044	1.089	0.703	6.4	9.13
NGC 3896	49	−17.36	−18.08	−18.55	−19.61	0.80	1.20	3.33	1.68	1.38	1.29	0.69	9.19
36953	7	13.62	12.59	12.05	10.57	1.02	1.56	3.05	1.000	1.065	1.259	3.5	9.13
NGC 3906	18	−17.33	−18.36	−18.90	−20.38	1.06	1.47	2.71	−0.74	−0.70	−0.55	−0.09	9.50
36990	0	14.90	13.75	13.22	11.61	1.15	1.68	3.29	1.000	1.029	0.794	4.9	8.61
UGC 6805	39	−16.05	−17.20	−17.73	−19.34	1.11	1.54	3.78	−0.65	−0.66	−0.67	−1.05	9.08
37024	7	13.25	12.28	11.93	10.30	0.97	1.32	2.95	1.058	0.892	0.867	5.5	9.27
NGC 3913	23	−17.70	−18.67	−19.02	−20.65	0.78	1.51	3.12	1.38	1.74	1.52	1.76	9.60
37036	6	11.81	10.84	10.39	9.02	0.97	1.43	2.80	1.009	0.925	1.068	3.0	9.85
NGC 3917	82	−19.14	−20.11	−20.56	−21.93	1.20	2.01	3.47	−0.41	−0.13	−0.35	−0.01	10.12
37037	9	14.21	13.57	13.03	11.91	0.65	1.18	2.31	0.969	1.108	1.015	3.4	8.89
UGC 6816	43	−16.74	−17.38	−17.92	−19.04	0.78	1.13	2.44	−0.36	−0.28	−0.15	−0.17	8.96
37038	7	13.65	13.10	12.73	11.64	0.55	0.91	2.01	0.910	0.915	0.924	3.4	9.11
UGC 6818	79	−17.30	−17.85	−18.22	−19.31	0.99	1.45	2.94	−0.33	−0.31	−0.27	−0.22	9.07
37045	10	16.83	16.04	15.73	···	0.80	1.11	···	1.120	1.200	···	6.2	7.84
1148+48	46	−14.12	−14.91	−15.22	···	0.67	0.89	···	−0.71	−0.72	−0.67	···	···
37073	−3	14.18	12.83	12.17	10.59	1.35	2.01	3.59	0.974	0.974	0.687	6.0	8.90
NGC 3931	37	−16.77	−18.12	−18.78	−20.36	1.40	2.05	4.46	1.27	1.30	1.31	0.99	9.49
37136	1	13.24	11.90	11.40	9.63	1.34	1.84	3.61	1.275	1.167	0.912	9.3	9.28

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(1) PGC Name	(2) Type Inclin.	(3) B_T^{bi} M_B^{bi}	(4) R_T^{bi} M_R^{bi}	(5) I_T^{bi} M_I^{bi}	(6) K_T^{bi} M_K^{bi}	(7) $B-R$ $\mu_0^B-\mu_0^R$	(8) $B-I$ $\mu_0^B-\mu_0^I$	(9) $B-K'$ $\mu_0^B-\mu_0^{K'}$	(10) h_R/h_B $\mu_0^B-\mu_4^B$	(11) h_I/h_B $\mu_0^R-\mu_4^R$	(12) $h_{K'}/h_B$ $\mu_0^I-\mu_4^I$	(13) $<C_{82}>$ $\mu_0^{K'}-\mu_4^{K'}$	(14) $\log L_B$ $\log L_{K'}$
NGC 3928	16	−17.71	−19.05	−19.55	−21.32	0.79	1.56	3.78	1.69	2.11	1.83	1.75	9.87
37164	9	14.34	13.32	12.73	11.86	1.02	1.61	2.48	1.003	1.117	0.859	5.1	8.84
UGC 6840	33	−16.61	−17.63	−18.22	−19.09	1.06	1.45	2.70	1.55	1.42	1.47	1.77	8.98
37217	9	14.76	13.84	13.49	11.88	0.92	1.27	2.88	0.966	0.915	0.966	3.1	8.67
NGC 3924	35	−16.19	−17.11	−17.46	−19.07	0.99	1.44	2.99	−0.20	−0.13	−0.13	−0.02	8.97
37229	5	10.94	9.96	9.51	7.82	0.98	1.43	3.12	0.898	0.828	0.705	3.8	10.20
NGC 3938	29	−20.01	−20.99	−21.44	−23.13	1.16	1.77	3.83	1.23	1.46	1.46	1.25	10.60
37290	4	11.34	10.57	10.19	8.42	0.77	1.15	2.92	1.086	1.064	1.032	3.7	10.04
NGC 3949	54	−19.61	−20.38	−20.76	−22.53	0.62	1.09	2.99	0.63	1.08	1.10	0.79	10.36
37306	4	10.74	9.49	8.89	7.01	1.25	1.85	3.73	0.991	0.946	0.995	4.4	10.28
NGC 3953	62	−20.21	−21.46	−22.06	−23.94	1.35	2.09	3.96	1.57	1.98	1.97	1.99	10.92
37418	6	14.43	13.73	13.54	12.34	0.70	0.89	2.10	1.286	1.161	1.491	3.1	8.80
UGC 6894	90	−16.52	−17.22	−17.41	−18.61	0.34	0.91	2.03	−1.20	−0.69	−0.98	−0.49	8.79
37466	4	12.31	11.38	10.92	9.33	0.93	1.38	2.98	1.044	1.000	0.948	3.0	9.65
NGC 3972	79	−18.64	−19.57	−20.03	−21.62	1.02	1.70	3.73	−0.71	−0.30	−0.36	−0.14	9.99
37520	3	12.22	11.18	10.76	8.81	1.04	1.47	3.42	1.075	0.981	0.915	3.5	9.68
NGC 3982	28	−18.73	−19.77	−20.19	−22.14	0.82	1.53	3.65	−0.31	0.31	0.08	0.22	10.20
37525	7	12.88	12.01	11.62	10.29	0.88	1.26	2.60	0.968	0.909	0.861	3.4	9.42
UGC 6917	59	−18.07	−18.94	−19.33	−20.66	1.01	1.55	3.10	0.37	0.54	0.53	0.63	9.61
37542	9	13.03	12.13	11.72	10.18	0.90	1.31	2.85	1.086	1.038	1.200	2.9	9.36
NGC 3985	53	−17.92	−18.82	−19.23	−20.77	0.84	1.42	2.98	−0.49	−0.39	−0.56	−0.35	9.65
37550	6	14.42	13.59	13.18	11.89	0.83	1.25	2.53	0.893	0.855	0.603	5.0	8.80
UGC 6922	34	−16.53	−17.36	−17.77	−19.06	1.13	1.66	3.72	0.30	0.32	0.29	−0.05	8.97
37553	8	13.52	12.74	12.18	11.02	0.78	1.34	2.50	1.054	1.205	0.880	5.0	9.16
UGC 6923	68	−17.43	−18.21	−18.77	−19.93	0.84	1.18	3.19	0.37	0.41	0.50	0.13	9.32
37584	7	12.59	11.65	11.34	10.32	0.94	1.25	2.27	0.985	0.909	0.805	3.8	9.54
UGC 6930	32	−18.36	−19.30	−19.61	−20.63	1.00	1.47	2.95	0.54	0.76	0.73	0.82	9.59

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PGC	Type	B_T^{bi}	R_T^{bi}	I_T^{bi}	K_T^{bi}	$B-R$	$B-I$	$B-K'$	h_R/h_B	h_I/h_B	$h_{K'}/h_B$	$<C_{82}>$	$\log L_B$
Name	Inclin.	M_B^{bi}	M_R^{bi}	M_I^{bi}	M_K^{bi}	$\mu_0^B-\mu_0^R$	$\mu_0^B-\mu_0^I$	$\mu_0^B-\mu_0^{K'}$	$\mu_0^B-\mu_4^B$	$\mu_0^R-\mu_4^R$	$\mu_0^I-\mu_4^I$	$\mu_0^{K'}-\mu_4^{K'}$	$\log L_{K'}$
37617	4	10.64	9.42	8.84	7.22	1.21	1.79	3.42	0.947	0.873	1.004	4.0	10.32
NGC 3992	58	−20.31	−21.53	−22.11	−23.73	1.40	2.24	3.47	1.34	1.63	1.48	2.22	10.84
37618	−2	13.53	12.08	11.36	9.54	1.45	2.17	3.99	0.992	0.922	0.695	8.5	9.16
NGC 3990	62	−17.42	−18.87	−19.59	−21.41	1.46	2.37	5.05	2.48	2.52	2.29	1.57	9.91
37621	6	15.67	15.13	15.02	13.93	0.54	0.64	1.74	1.155	1.141	1.732	3.5	8.30
UGC 6940	79	−15.28	−15.82	−15.93	−17.02	0.46	0.72	1.62	−0.49	−0.40	−0.49	−0.33	8.15
37642	−3	11.73	9.55	9.29	7.35	2.18	2.44	4.38	0.903	1.029	1.077	11.8	9.88
NGC 3998	38	−19.22	−21.40	−21.66	−23.60	2.48	2.38	4.23	3.08	2.74	3.04	3.06	10.78
37682	9	14.97	13.74	14.01	12.06	1.23	0.96	2.91	1.080	0.764	0.876	4.0	8.58
UGC 6956	45	−15.98	−17.21	−16.94	−18.89	1.12	1.63	3.27	0.42	0.41	0.25	0.25	8.90
37691	3	11.60	10.21	9.49	7.62	1.39	2.11	3.99	0.937	0.885	0.595	3.7	9.93
NGC 4013	88	−19.35	−20.74	−21.46	−23.33	1.72	2.64	5.89	−1.17	−1.32	−0.79	0.05	10.68
37692	6	12.81	11.84	11.39	10.11	0.97	1.42	2.70	1.012	0.946	1.144	2.9	9.45
UGC 6962	38	−18.14	−19.11	−19.56	−20.84	0.93	1.56	2.45	−0.78	−0.54	−0.65	0.00	9.68
37697	7	12.52	11.56	11.09	9.16	0.96	1.43	3.37	1.016	1.012	1.202	2.9	9.56
NGC 4010	90	−18.43	−19.39	−19.86	−21.79	1.09	1.65	3.04	−1.96	−1.56	−1.39	0.17	10.06
37700	9	14.48	13.91	13.72	12.54	0.57	0.76	1.94	1.065	0.992	1.202	3.0	8.78
UGC 6969	76	−16.47	−17.04	−17.23	−18.41	0.65	1.10	2.22	−0.86	−0.68	−0.82	−0.37	8.71
37719	2	12.50	11.00	10.33	8.20	1.50	2.17	4.30	0.926	0.852	0.480	5.3	9.57
UGC 6973	70	−18.45	−19.95	−20.62	−22.75	1.75	2.67	6.47	1.61	1.87	1.81	0.42	10.44
37722	10	16.06	14.95	14.46	···	1.11	1.60	···	···	···	···	2.1	8.15
1156+46	54	−14.89	−16.00	−16.49	···	1.01	1.28	···	−0.21	−0.13	−0.09	···	···
37735	6	12.95	12.18	11.84	10.51	0.76	1.10	2.43	0.887	0.834	0.741	3.8	9.39
UGC 6983	50	−18.00	−18.77	−19.11	−20.44	1.05	1.51	3.18	1.01	1.06	0.82	0.96	9.52
37760	−2	11.67	10.23	9.55	7.65	1.44	2.12	4.02	0.971	0.960	0.928	7.3	9.90
NGC 4026	80	−19.28	−20.72	−21.40	−23.30	1.51	2.22	4.22	2.62	2.65	2.29	2.18	10.67

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PGC	Type	B_T^{bi}	R_T^{bi}	I_T^{bi}	K_T^{bi}	$B-R$	$B-I$	$B-K'$	h_R/h_B	h_I/h_B	$h_{K'}/h_B$	$<C_{82}>$	$\log L_B$
Name	Inclin.	M_B^{bi}	M_R^{bi}	M_I^{bi}	M_K^{bi}	$\mu_0^B-\mu_0^R$	$\mu_0^B-\mu_0^I$	$\mu_0^B-\mu_0^{K'}$	$\mu_0^B-\mu_4^B$	$\mu_0^R-\mu_4^R$	$\mu_0^I-\mu_4^I$	$\mu_0^{K'}-\mu_4^{K'}$	$\log L_{K'}$
37832	10	14.42	13.30	12.77	...	1.12	1.65	...	1.047	1.056	...	3.2	8.80
UGC 6992	65	−16.53	−17.65	−18.18	...	1.13	1.71	...	−0.90	−0.75	−0.72	...	...
38068	4	10.84	9.80	9.31	7.85	1.04	1.53	2.98	1.013	1.000	0.651	4.0	10.24
NGC 4051	50	−20.11	−21.15	−21.64	−23.10	1.01	1.52	4.06	2.84	2.85	2.80	2.38	10.58
38283	5	12.24	11.29	10.82	9.14	0.95	1.43	3.11	1.000	1.017	1.012	3.2	9.67
NGC 4085	82	−18.71	−19.66	−20.13	−21.81	1.19	1.71	3.85	−1.08	−0.29	−0.10	0.04	10.07
38302	4	10.75	9.71	9.15	7.43	1.04	1.61	3.32	0.959	0.924	1.088	3.0	10.27
NGC 4088	71	−20.20	−21.24	−21.80	−23.52	1.33	2.05	3.58	−0.25	0.24	0.37	0.71	10.75
38356	8	12.89	12.19	11.90	11.05	0.70	0.99	1.85	1.055	1.015	1.052	3.5	9.41
UGC 7089	90	−18.06	−18.76	−19.05	−19.90	0.86	1.36	2.78	−0.14	−0.05	−0.10	−0.28	9.31
38356.1	10	16.53	15.72	15.52	...	0.81	1.01	...	1.203	1.014	...	3.7	7.96
1203+43	47	−14.42	−15.23	−15.43	...	0.53	1.11	...	−0.49	−0.31	−0.60	...	...
38370	4	11.19	10.15	9.64	7.97	1.03	1.55	3.22	0.971	0.955	0.895	2.9	10.10
NGC 4100	77	−19.76	−20.80	−21.31	−22.98	1.28	1.92	4.05	0.29	0.50	0.54	0.55	10.54
38375	8	14.24	13.40	12.99	11.55	0.85	1.26	2.69	1.021	1.037	0.853	4.5	8.87
UGC 7094	72	−16.71	−17.55	−17.96	−19.40	0.98	1.44	3.43	0.23	0.14	0.11	−0.16	9.10
38392	2	11.81	10.41	9.83	7.85	1.40	1.98	3.96	1.023	0.971	1.152	7.6	9.85
NGC 4102	58	−19.14	−20.54	−21.12	−23.10	1.28	1.99	3.13	0.79	1.55	1.59	2.64	10.59
38440	−1	11.40	9.95	9.25	7.60	1.45	2.15	3.80	1.062	1.022	0.875	7.8	10.01
NGC 4111	84	−19.55	−21.00	−21.70	−23.35	1.19	2.07	4.07	2.91	3.29	3.03	2.45	10.68
38503	−2	14.05	12.47	11.81	9.98	1.58	2.24	4.07	1.069	1.160	0.924	6.1	8.95
NGC 4117	67	−16.90	−18.48	−19.14	−20.97	1.32	1.74	4.05	1.40	1.76	1.98	1.77	9.73
38507	10	15.66	14.71	14.21	12.88	0.95	1.45	2.78	0.944	1.042	0.792	5.5	8.31
NGC 4118	55	−15.29	−16.24	−16.74	−18.07	1.28	1.57	3.73	0.82	0.46	0.51	0.07	8.57
38582	1	14.01	12.73	12.14	...	1.28	1.87	...	1.040	0.937	...	4.4	8.97
UGC 7129	47	−16.94	−18.22	−18.81	...	1.28	2.19	...	0.82	0.80	0.46	...	...
38643	1	12.10	10.62	10.02	8.18	1.48	2.08	3.92	1.118	1.124	0.975	5.3	9.73

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(1) PGC Name	(2) Type Inclin.	(3) B_T^{bi} M_B^{bi}	(4) R_T^{bi} M_R^{bi}	(5) I_T^{bi} M_I^{bi}	(6) K_T^{bi} M_K^{bi}	(7) $B-R$ $\mu_0^B-\mu_0^R$	(8) $B-I$ $\mu_0^B-\mu_0^I$	(9) $B-K'$ $\mu_0^B-\mu_0^{K'}$	(10) h_R/h_B $\mu_0^B-\mu_4^B$	(11) h_I/h_B $\mu_0^R-\mu_4^R$	(12) $h_{K'}/h_B$ $\mu_0^I-\mu_4^I$	(13) $\langle C_{82}\rangle$ $\mu_0^{K'}-\mu_4^{K'}$	(14) $\log L_B$ $\log L_{K'}$
NGC 4138	53	−18.85	−20.33	−20.93	−22.77	1.25	1.87	4.07	1.19	1.73	1.83	1.55	10.45
38654	−2	12.06	10.55	9.84	7.86	1.51	2.22	4.20	0.912	0.747	0.706	8.0	9.75
NGC 4143	59	−18.89	−20.40	−21.11	−23.09	1.69	3.02	5.11	2.49	2.43	1.89	1.52	10.58
38781	10	15.34	15.02	14.88	14.59	0.32	0.46	0.76	1.058	0.922	0.823	2.6	8.43
UGC 7176	80	−15.61	−15.93	−16.07	−16.36	0.46	0.84	2.16	−0.27	−0.22	−0.23	−0.25	7.89
38795	3	11.26	10.01	9.41	7.46	1.25	1.85	3.81	0.800	0.796	0.525	3.9	10.07
NGC 4157	90	−19.69	−20.94	−21.54	−23.49	1.97	2.68	6.05	0.48	0.62	0.68	−0.41	10.74
38951	10	14.61	13.83	13.44	12.33	0.78	1.17	2.29	1.091	1.050	2.099	2.7	8.73
UGC 7218	60	−16.34	−17.12	−17.51	−18.62	0.75	1.28	1.88	−0.98	−0.82	−0.84	−0.28	8.79
38988	6	12.12	11.41	11.05	9.70	0.71	1.07	2.43	0.992	1.003	0.949	3.2	9.72
NGC 4183	90	−18.83	−19.54	−19.90	−21.25	0.98	1.44	3.33	−0.19	0.06	0.13	0.35	9.85
39237	9	13.50	12.72	12.33	10.82	0.78	1.17	2.68	1.073	0.740	0.750	3.2	9.17
NGC 4218	55	−17.45	−18.23	−18.62	−20.13	0.77	2.18	3.84	0.06	0.21	−0.77	−0.83	9.40
39241	3	11.31	10.04	9.38	7.55	1.27	1.93	3.77	0.938	0.925	0.687	3.3	10.05
NGC 4217	80	−19.64	−20.91	−21.57	−23.40	1.67	2.47	5.33	−0.82	−0.12	0.28	0.48	10.71
39285	1	11.70	10.38	9.71	8.32	1.32	1.99	3.38	1.008	0.992	0.692	4.2	9.89
NGC 4220	76	−19.25	−20.57	−21.24	−22.63	1.47	2.25	4.81	0.79	1.04	1.08	0.44	10.40
39344	7	14.70	13.99	13.80	12.67	0.71	0.90	2.04	1.074	0.932	0.966	3.2	8.69
UGC 7301	90	−16.25	−16.96	−17.15	−18.28	0.85	1.43	2.91	−0.42	−0.25	−0.48	−0.22	8.66
39864	10	15.54	14.72	14.37	···	0.82	1.17	···	1.115	1.115	···	3.5	8.36
UGC 7401	56	−15.41	−16.23	−16.58	···	0.69	1.10	···	−0.57	−0.46	−0.41	···	···
40228	−2	12.14	10.69	9.96	8.21	1.45	2.18	3.93	0.981	1.129	0.749	8.2	9.72
NGC 4346	75	−18.81	−20.26	−20.99	−22.74	1.48	1.88	4.62	2.72	2.82	3.04	1.95	10.44
40537	4	12.42	11.25	10.81	9.11	1.17	1.61	3.30	1.016	0.995	0.842	3.6	9.61
NGC 4389	50	−18.53	−19.70	−20.14	−21.84	1.23	1.75	3.93	0.22	0.28	0.21	−0.10	10.08

Fig. 1.— Groups and non-group galaxies in the plane of the Local Supercluster. The double concentric circles are centered on the Virgo Cluster; the inner circle defines the dimension of the cluster and the outer circle indicates the current observed turnaround radius. The Ursa Major Cluster lies within the other circle near the tangent with the Virgo infall sphere. The Local Group lies at the origin of the plot and the 10° wedge locates the zone of obscuration where there is incompleteness. The three stars identify Virgo, Ursa Major, and Virgo W, the three clusters in the supercluster plane with $\log L_B \geq 11.5$. Open circles identify groups with $10.5 \leq \log L_B < 11.5$ and crosses indicate groups or individual galaxies that are fainter.

Fig. 2.— Projection on the sky of all galaxies in the *NBG* catalog with $V_\circ < 2000$ km s^{-1} and $45^\circ < SGL < 95^\circ$, $-10^\circ < SGB < 15^\circ$. Filled circles: identified with Ursa Major Cloud; open squares: identified with our local Coma-Sculptor Cloud; crosses: identified with other structures.

Fig. 3.— Redshift cone diagram of the region displayed in Figure 2. Symbols have the same meaning. In panel *b* the separate groups identified in Tully (1987) are outlined.

Fig. 4.— Amplification of Figure 2. Velocity limits are now $400 < V_\circ < 1700$ km s^{-1}. Filled circles: group 12-1 = Ursa Major Cluster; boxes with inner crosses: group 12-2; crosses in circles: group 12-3; crosses: other galaxies in cloud 12; open squares: galaxies in cloud 14. The circle encloses the Ursa Major Cluster systems. It has a radius of 7.5° and is centered at $\alpha = 11^h56.9^m$, $\delta = 49^\circ22'$.

Fig. 5.— Velocity histograms of the galaxies in three equal projected areas. The top panel is the histogram of 49 galaxies with $73 \leq SGL < 87$. The middle panel involves 100 galaxies with $59 \leq SGL < 73$. The bottom panel involves 28 galaxies with $45 \leq SGL < 59$. In all three cases, the galaxies lie within the latitude limits $-2 < SGB < 7$. Galaxies associated with the Ursa Major Cluster contribute to the filled histogram.

Fig. 6.— Projected positions of the 79 galaxies in our Ursa Major sample in supergalactic coordinates. The cluster is contained within a 7.5° radius. Filled circles denote types E-S0; open circles, types S*a*-S*cd*; crosses, types S*d*-I*m*. Larger symbols denote galaxies with $M_B < -19$.

Fig. 7.— B-band CCD images of 79 galaxies in the Ursa Major Cluster. All images are on a common scale: at a distance of 15.5 Mpc, 1 arcmin = 4.5 kpc. Galaxies are ordered from brightest to faintest in integrated blue light. The first 8 plates contain the complete sample. Images are reproduced with a logarithmic grey scale.

Fig. 8.— Surface brightnesses, colors, and isophotal axial ratios as a function of radius. Surface brightness dependencies are shown in the top panels, with data from bottom to top corresponding to B, R, I, K' respectively. Small arrows indicate the disk central surface brightness and exponential scale length at B band. Color dependencies at $B - R$ are shown in the central panels. Isophotal axial ratios as a function of radius are shown in the bottom panels. The horizontal line indicates the axial ratio consistent with the preferred inclination.

Fig. 9.— Measures of radial color change. The left panels compare integrated colors (horizontal) vs colors from differences between the disk central surface brightnesses (vertical). Colors are identical at a point along the 45° line. The right panels compare scale length ratios with the disk central surface brightnesses. The color comparisons are $B - R$ on top, $B - I$ in the middle, and $B - K'$ on the bottom.

Fig. 10.— Magnitude increments at the radial interval of the faintest two magnitudes of the surface brightness growth curve plotted as a function of the disk central surface brightness. Members of the bright complete sample are indicated by dots and the fainter galaxies are indicated by crosses. The expectations of the exponential disk growth-curve model are given by the solid curves. In the lower part of each panel, the model extrapolations beyond the observed limiting isophotes are shown as solid curves and the 88% values that are the adjustments that are actually made are shown as dashed lines. The four panels are for B, R, I and K' respectively.